

*Vitalism and the Scientific Image* is an ambitious book which provides interesting insights for the contemporary philosophy of biology. It especially makes an important point in showing that conceptual history is a useful tool to frame our contemporary problems correctly and to avoid new cases of intellectual amnesia.

(Andrea Gambarotto)

FRANCESCA MICHELINI, JONATHAN DAVIES (eds.), *Frontiere della Biologia: prospettive filosofiche sulle scienze della vita*, Mimesis, Milano 2014, 328 pages, ISBN 978-88-575-1784-1.

The volume «*Frontiere della Biologia*» was published in 2013 by Mimesis under the editorial direction of Francesca Michelini and Jonathan Davies. All contributions are in Italian and are elaborated from papers presented in the international seminar «*Frontiere della Biologia*», held at Fondazione Kessler in Trento.

The book declares its intentions upfront, starting with a most peculiar title: «*Frontiere*» (i.e. «boundaries»), which has in fact an often-unnoticed ambivalent meaning. On the one hand, it indicates the limits within which the object in question is exhausted, but on the other it also embodies the space where two separated areas «touch» and mix one into the other. A boundary could hence mean a passage to beyond-regions open to exploration, signifying a difference and a connection at the same time.

Concentrating on this duplicity endorses a perspective of «unity in diversity», where a unitary insight leads to methodological definitions and programmatic agendas.

The volume intends to inquire the «boundaries» of biology in both senses of the term: it aims at a methodological redefinition of biology as a science while it points at new directions for biological research and interdisciplinary confrontation.

The book hence draws the future of biology in two different ways: while it indicates its furthest frontiers and objectives, it shows how biology itself could be the most efficient mean to see interrelations between all other natural sciences, turning tables to

the reigning paradigm of hyper-specialism in favor of a renewed conception of natural inquiry as a whole.

Biology is then meant to be the perspective from which boundaries are seen as points of contact, rather than lines of sharp demarcation. This is, according to all contributors, the main by-product of the «revolution», which occurred in the world of natural inquiry since the discovery of DNA, which at its turn signified the rise of the «century of biology» and the end of the times in which physics was considered the core science instead.

Biology is now experiencing an enhancement of attention and importance of its research on the one hand and a broadening of its objectives on the other; thus, not only a redefinition of its methodological basics and an establishment of its programmatic agenda is urgent, but also a meta inquiry aimed at reconstructing the interdisciplinary changes that the «biological revolution» could carry along. Here is where philosophy comes into play, questioning the consistency of epistemological frameworks and ontological implications of naturalistic description, as well as its own relation to biology, possibly falling under the «boundary paradox» while embodying it so well in its constitutive questioning of foundations (i.e. in considering the concept of observation, bioethics proves itself impossible to be considered as an area of philosophy as sharply separated by all others, such as epistemology and bio-philosophy).

The volume is a collection of fourteen essays from various authors, all of them unpublished with the exception of two (Dupré-O'Malley; Griffiths-Stotz), accompanied by an introduction by the editors. The essays are grouped in three sections of interest, corresponding to the triple aim of philosophical reconsideration of biology and natural sciences in general: philosophy of nature, biology and philosophy and epistemology of science. Volume partitions are not meant as sharply separated from each other, and they acquire their ultimate relevance only in the framework of an analysis of methodological support.

Every essay focuses on one keyword, expressing a fundamental concept in biological inquiry, and outlines a state of the art summation of research advancements on the matter, its potential directions of development and how it is through these very

two considerations that the urgency of a new perspective for interdisciplinary confrontation is shown.

The first part, «Philosophy of Nature», re-examines classic matters of the philosophy of life, such as what difference, if any, there is between man and animal, what defines human nature in its specific character and what defines life in itself, with the related question of the relation between life and death and whether aging is an intrinsic natural process or an evolutionary selected variant.

All essays of the section («Life», Dupré-O'Malley; «Human Nature», Rasini; «Animal», Costa; «Aging», Giaimo-Boniolo; «Environment», Gagliasso) cope in different ways with the peculiar notion of «environment», which is thematically analyzed in its new perspectives and meanings by the last essay in the group. That is also the ground notion, which permits the recovery of long-forgotten questions from classic natural science and philosophy of nature.

While in fact recent research in biology tackles the common concept of life as referred to cellular-based entities and shows how biological identity is instead founded in original collaborations between organisms, proving the relevance of internal environment to the grounding of apparently independent individuality, it is the external ambient which is important for the definition of human nature, the one stressed by a close analysis of the notion itself. Likewise, a flip between conceptions of identity, individuality and relation or interaction is produced in the analysis of the notions of *animalitas* and aging: while a peculiar overlapping of the roles of the observer and the *observatum* lies in the metaphysical mystery of our own animal component as humans, aging is becoming more and more an enigma due to recent research on the matter, challenging its common concept as an inescapable fact and introducing the possibility of its being a product of natural selection and as such, again, not an intrinsic character of individuals, but an environment-bound feature.

All those revolutions and changes in scientific common sense make a specific question on the notion of «environment». Is «environment» a non-problematic notion in biology? Does it have one meaning, or is it in itself polysemous?

Of course, the answer to both questions is no, but this, instead of constituting an obstacle, is exactly what permits this notion to be the starting point for the construction of new path-breaking approaches to what is apparently already known. Until recently, the general tendency towards the notion of environment was in fact the one of proceeding to a rigid semantic separation according to the context of usage; there are distinct meanings of «environment» depending on the discipline of reference, for instance there is a notion of environment in ecology which is considered to be completely detached and unrelated to the one given in biology and micro-biology. While environment could then define limits between different areas of research, it could constitute a boundary between them also in the sense of a space of interconnection and therefore as a ground of interdisciplinary confrontation. Such a consideration opens to a meta-dimension of renewed inquiry in epistemological, historical and philosophical matters on the one hand, and endorses new connections between biology, micro-biology and ecology on the other. While the new frontiers of discovery in biology urge in the direction of *eco-evo-devo* theories, stressing the intrinsic connection between evolution, natural selection and environment-based changes in organisms, both externally and internally, would endorse an all-inclusive notion of environment, which would follow what was considered one of the two main merits of the Darwinian revolution, that is, a conception of nature as a whole in the process, a «Bioma».

It was from this seed that ecology evolved through Lamarck's heritage and nineteenth century botanic insights, becoming an independent discipline, though forgetting its binds to biology, which was even meant by some to become only one of its parts in the consideration of the totality of its conditions of existence.

It is only in the renewed attention to means of natural selection other than DNA in biology that a rethinking of the ecology-biology relation is found, and exactly along the lines of the similarity of their changing and opening concepts of environment.

In this sense, not only the notion of environment can assume many directions for further research in (eco)biology, but it also endorses a change of perspective in epistemological attitude: it enhances the perception of an organic whole not only in se-

semantic definition and methodology, but most importantly in nature itself, which is discovered as an active process of constant selection and change, and relationally-based at its core.

The section then builds on the environment bind in two main meanings: while it declines different shades of the peculiar flip between an individuality-based consideration and a relationally-based one in natural inquiry, it indicates ways to it in opening to influence between the different sciences and their fields of research.

The second section is «Biology and Philosophy», and, as the name suggests, focuses on the interaction between philosophical inquiry and biological research and its potential benefits. The section builds on a specific conception of philosophy, namely that of a science of semantic clarification, which makes all the contributions of this part more specific on the relationship between so-intended theoretical speculation and natural science compared to the preceding group of essays.

All contributions reconstruct a genealogy of their keyword of interest, showing that it is by historical semantic recollection and definition that different methodological hints and epistemological questions emerge to fit together with current research. In this sense, philosophy as a work of clarification on texts and words plays a preliminary role to all research, ensuring not only its historical accuracy and a sound confrontation with tradition, but also conceptual richness and correctness in the acknowledgment of metaphysical frameworks. While a semantic study of the term «Darwinism» (Depew, Weber) enables one to see the necessity of an extension of the term's meaning and henceforth of its theoretic ground in order to enclose new dynamic models of evolution (some of which were for instance named and briefly presented in the previous essay on environment); the inner controversial character of the term «Species» (Continenza) suggests a re-examination of the term's implications with matters of the history of science in order to lift the clash between topological and population-based approaches.

Philosophy helps make distinctions preliminarily to applicative research, as in the case of the term «Gene» (Griffiths, Stotz), where three different meanings need to be kept sharply separated (instrumental, post-genomic, nominal); furthermore it can show

how some concepts not commonly related with biology fit with its newest results and discoveries, giving them proper description and conceptual classification, which happened with the term «Network» (Civello).

It is down both lines, prior to applicative research and *a posteriori* that the essay on the concept of «Organism» (Toepfer) is built upon. While it draws a genealogy of the term in its revolutionary effect towards mechanistic, or Cartesian, conception of nature, the essay shows how recent developments of research require a second analysis of the term, in order to differentiate between a functional, broader, meaning and an operational one, so to avoid metaphysical misunderstanding and relativistic drifts.

Originally, the conception of «Organism» was connected with the one of reciprocity, both between parts composing the whole (i.e. organs) and between different functions and enacted processes. In this sense, organism was an immanent notion aimed at replacing the transcendent, non-scientific one of «soul», starting to take over with the Enlightenment. «Organism» was hence intended as intrinsically linked to the notions of «life» and «living being». As a mean of immanent unity and activity, the notion of organism was run by a causal cycle securing autonomy: that is, in an organism every function is also a goal as a principle of its autonomy. Teleology became then the dominating perspective in the study of organisms and in the definition of the term, as best brought up by Kant basing on eighteenth century botanic legacy. Teleological consideration took over mechanistic conceptions since it was able to account for a scientific grant on intrinsic unity amongst the parts. Such a unitary flare was abandoned in biology when the discovery of genes and DNA gave considerable push towards an 'atomistic' conception of living beings, where life was intended to be truly embodied in cells and not in organisms and, most especially, as a process so much extended over time, as over the time window of advancement processing in evolution, that organisms could be nothing but transient, irrelevant and partial embodiments.

If recent research in biology and ecology conducted a fairly diffused renaissance of the concept of organism, there are several metaphysical side effects and traps that come with this return in fashion. The traditional conception of the organism as a func-

tional unity produces in fact several misunderstandings, when this is applied to recent research outcomes on internal and external environment based relations and to the implications they had on biological and morphological identity. It is in fact unclear if the functional definition of organism applies to all functional aggregates, also to non-living ones, and, most especially, how does such a functional definition apply to organism-environment interactions. A functional consideration of the organism might in fact lead to an overestimation of the interconnection between organism and environment, and lead to a naïve pantheistic conception, in which the boundaries between the commonly meant single living being and its habitat are completely erased due to the fact that the environment too is participating in the functional process defining the organism as one entity. While this might be open to a biological ground for the speculation of nineteenth century philosophical anthropology (Plessner and Scheler), it could be risky to follow the slippery slope of holistic simplification. It is then contemporary philosophy of nature and bio-philosophy's duty to preserve the polysemous character of the notion of organism, insisting on its controversial edges to keep it linked to the enigmatic character of «emergence», which made it the core notion of life sciences. The essay then calls the attention to many apparent counterintuitive features of the term: for instance, while it is commonly connected to the notion of a living being as its innermost character, «organism» cannot coincide with the notion of «body», since the latter lacks in functional determination and covers exclusively (in most cases) its morphological determination; on the other hand, another controversial aspect of the functional definition of the organism is posed by reproduction and death: how relevant are these to be considered if the meaning of the organism is to be built on its functions? What would this imply on the morphological side then?

The third and final group of essays goes under the title of the epistemology of science. The section tracks all the main epistemological side effects carried along by the recent biological revolution, that is the substitution of biology to physics as the leading science in naturalistic explanation. It is on this very train of thought that possibilities of shedding light on new interactions

between research fields are analyzed and linked to epistemological concerns that might arise. Hardly surprising, the section proves how a by-product of this very epistemic revolution is to have brought up several old concerns in the philosophy of nature, forgotten at once with the physicalist paradigm take-over in nineteenth century. In a mix between innovation and tradition, the section tackles common sense on epistemic frameworks, showing how a twist in the past might suggest an ontological enhancement of those patterns, to better face the challenges of the future of research.

While this *fil rouge* is declined on the three classic models of explanation in «Mechanism» (Powell), «Emergence» (Davies) and «Teleology» (Michelini), the opening essay of the section, «Observation» (Köchy) puts the epistemic point under a rather more general and at the same time more radical perspective.

The act of observing is in fact the basic action towards which epistemology is oriented, questioning the notion then implies a reconsideration of epistemology in itself and from within. The essay moves from Merleau-Ponty's suggestion of a relational take on the act of observation, endorsing a dimension where a determined epistemic attitude corresponds to a different onto-logical grasp. In such a perspective, away from excessively structuralist views, the observer, observation and *observatum* fuel the epistemic core act in its interconnection rather than in their sharp separation. Science would then always be defined in operational context, and not with a hypostatic level of absolute objectivity anymore.

In this sense a new epistemology would be built, opposed to the common sense one of the *kosmotheoros*, that is one of the «big objects», in which the world stands, independent from observing and awaiting for an observer to produce a neutral description of it. The latter determination of epistemological attitude, even if it was the enduring take on science until recently, is unable to account for the complexity of all mechanisms enacted during observation. The essay sketches a deck of ten objections to such a model, which becomes also a programmatic statement of intent for a new epistemology. Firstly, the paradigm of a non-relational observation does not take into consideration the duplicity intrinsic in the observer figure, who is at the same time a living being, a natural entity (similar to the *observatum*) and a human being de-

fined in its ability to differentiate from its context namely through the (self) reflective act of observation. Furthermore, observation takes place in the mind but is enacted by and within a body, which is in itself vehicle of additional information and variability at the same time. Secondly, the act of observation does not exist out of a context, which is not only the actual physical surroundings, but most especially (and long forgotten) cultural and historical ones. Finally the *observatum* never comes in total passivity, but most of the times and especially in biological research appears in action and inter-action with the observer. While the latter consideration hence opens the necessity of analyzing a complex deck of participation, communication, and recognition modes, under a perspective where bio-philosophy immediately equals to bio-ethics, the previous two show how relevant the opening of biological methodology could be to insights coming from other disciplines such as psychology and neurosciences in order to build a new epistemological framework.

«Frontiere della Biologia» is definitely a useful tool to all scholarly levels: while it can be the perfect guide to new directions of research for both experienced scholars and beginners, it does provide helpful insights in support of studies which already focus on bio-philosophical essays, while also executing a peculiar role of a boundary exploration. In fact, it brings many different backgrounds to the table, calling all further efforts in research towards a common ground, which will define, and orient all their individual differences.

(Elena Tripaldi)

ANDREA BORGHINI, ELENA CASETTA, *Filosofia della biologia*, Carrocci, Milano 2013, 307 pages, ISBN 978-88-430-6951-4.

The idea behind the newly-published volume *Filosofia della biologia*, by Andrea Borghini and Elena Casetta, is that the fundamental concepts used by science remain unfulfilled in the sphere of scientific practice, which, from their viewpoint, implies the necessity to resort to philosophy. The authors appear to imply the above-mentioned position, as they take an interest in those no-