EDITORS' INTRODUCTION: MORPHOLOGY, ORGANISM, EVOLUTION

The dialogue between philosophy and life sciences has increasingly intensified over the last decades, developing a prolific exchange network that leads the former to face the question of life in the light of the rich patrimony of knowledge offered by the latter, while encouraging the latter to reflect upon the structures and categories of being as an ontological texture of the living world.

An overview of this fertile research field is presented in the current issue of *Thaumàzein*, which aims in particular to elucidate the conceptual constellation of morphology, organism, and evolution that is one of the central topics of the debate, involving, along with philosophers from various disciplines and life scientists, also scholars of the so-called theoretical biology (or metabiology). Actually, by questioning life and the complexity of its expressions from the biological level to the semantic-symbolic one, philosophy is not new to such exchanges with science. A first example of this interaction is provided by the so-called pre-Socratic thinkers and subsequently by Aristotle, whose investigations keep attracting the attention of scholars for a series of valuable intuitions in the biological field. Nonetheless, the contemporary research, to which the present issue aims at offering a contribution, detects in Goethe's age its fundamental reference in the philosophical and scientific tradition.

Goethe observes the living beings from a kind of eidetic perspective that in many ways seems to anticipate the phenomenological inquiry, from Husserl and Scheler onward. He is interested in beings as forms and he expressly calls this project *Morphologie*, which he understands to be an inquiry into form. His aim is to explore the entire reality, from its inorganic manifestations to the human being and its spiritual expressions. According to Goethe, every being has a phenomenal nature that can be perceived, seen and observed, even though each form is not ontologically determined and fixed (*Gestalt*, *Bild*), but mobile and in constant becoming, being involved in a process of "formation" (*Bildung*) by means of "transformation" (*Umbildung*). Before Goethe, *Bil-*

dung was generally identified with the capacity of receiving an external form in a passive way, like clay or soft wax can receive the imprinting of a seal. According to Goethe, instead, a living being is the subject of *Bildung* that is not a passive condition in which a predetermined form is impressed; rather, *Bildung* means the possibility of constant creation of new forms in a process of transformation that cannot be reduced to mere adaptation. The most immediate philosophical consequence of this perspective is represented by Schelling's philosophy of nature. He conceives of the organism as being the expression of a circular and retroactive causality inasmuch as, for him, the temporal cause-effect relation is no longer to be assumed in the sense of succession, but rather in that of simultaneity. In this relation, the effect exceeds the cause. In this respect, Schelling seems to anticipate Jonas by establishing an essential connection between organism and freedom, and defining the organism as a physical schema of freedom.

The relevance of Goethe's theoretical project lies in its eidetic character, which derives from its ambition to grasp the *Urform*, that is to say, the original prototype of every kind. However, his conception of form also bears many similarities with the contemporary notion of form as the result of an ontological dialectic between invariance and transformation at the core of reality. This thesis recurs in various essays published in this issue. It represents a *Leitmotiv* around which the various scholars investigate the question of the living being in a sort of intermediate space between nature and art, natural and artistic forms.

Without entering into details here about the history of morphology, it is important to observe that Goethe's project does not immediately receive the attention it deserves at least from philosophy, at the time dominated by Hegel's perspective. A year before his death in 1832, on the occasion of the third edition of *Metamorphosis of Plants*, the elderly Goethe expresses his profound regret for being known as a poet, but not seriously considered as a scientist or a philosopher of nature despite his scrupulous commitment to the study of the natural organic and physical phenomena, due to his understanding of morphology as being a science ancillary to physiology.

However, the foundations of morphology have already been laid; at approximately the same point in history, Burdach also uses the same

term to designate a doctrine of form concerned with studying the laws of development of organisms. From this point forward, a long tradition of morphological studies has developed that has not always been exempt from aporias and crises. Today morphology is conceived more as a methodological tool than as a proper discipline. It can also be seen as a methodological approach for a multidisciplinary research field that, also drawing on the Goethean matrix, focuses on those levels of structural designs called building plans (*Baupläne*). The *Baupläne* show how form and function essentially constitute an ontological relationship through which a living form comes into being, develops, and articulates as an emerging reality. This perspective gives rise to many questions: whether, for instance, an organism may be assumed as an autopoietic system or as a heteropoietic process; or how the individual's ontogenesis can be considered to be an open epigenetic development by posing the relation between every individual and its species.

However, in the field of knowledge, we are witnessing today a significant relaunch of the morphological perspective after several disputes about its validity, including the one involving Uexküll, or after the paradigm of modern synthesis reduced its heuristic calibre. Nevertheless, Uexküll's critical point of view must not mislead us since he is the proponent of a conception of the living organism whose constitution, being, and behaviour cannot be reduced to physicalist explanations on a mathematical basis. This aspect is another common point emerging from the different essays in this issue. Various scholars propose an "alternative logic" to understand life and its processuality, expressly underlining the limits of mechanistic models of explanation. This common position has doubtless much to do with a metamorphic conception of the living organism, which is already at the core of Goethe's theory.

Indeed, from the Goethean doctrine, the contemporary research retrieves, under the title of plasticity, the concept of metamorphosis as the structural constitution of living beings, hence definitively abandoning a vision of living beings as hypostatized substances rigid and steady in their essence. It views and analyses living beings as forms constantly subject to ongoing changes and continuous reconfigurations. After all, this position is also a central topic in today's Evo-Devo perspective, which is less "genocentric" in the awareness that there is no one-to-one

relationship between genes and phenotypes. Once again, emphasis is placed on the impossibility to read the living world only according to a reductionist model or a hard naturalism while we need – as Habermas would suggest – a softer naturalism able to bypass the gnoseological limits of radical physicalism. Such a view can already be traced back to Goethe and Bergson. They can be regarded as inaugurators of a philosophy of the living being endowed with its own categories that cannot be reduced to those of physics. However, such a theoretical approach was subsequently sidelined by a reductive interpretation of biological sciences aiming to understand life by eliminating all categories not directly attributable to physical or chemical laws. As known, such a paradigm tried to generate families of forms through generative algorithms, which were often mathematically elegant (for example, fractals) but very far from biological reality. In other cases, adaptation was used as a kind of mechanistic model of ontological explanation for living beings.

From today's perspective, instead, natural selection can only act on the products of developmental mechanisms actually operating in nature. There are perfectly functional biological forms that, had they appeared, would have been very successful, yet never saw the light. At the same time, "monstrous" individuals are born even though their survival chances are so scarce that they do not even reach adulthood. Therefore, a morphological consideration of form leads to rethinking the concept itself of evolution beyond that of mere adaptation. For a time, in biological research, interest in form was the prerogative of developmental biology while it practically remained neglected by evolutionary biology. Nevertheless, research in recent decades has led to a reinterpretation of the concepts of evolution and evolutionism, focusing more on the problems of form and morphology. It is acknowledged that, in order to understand living forms as they exist in nature, one cannot be satisfied either with the functionalist logic of evolutionary biology or with the explanations provided by developmental biology in terms of ontogenetic processes: neither research line alone is sufficient to analyse living forms. Therefore, Evo-Devo teaches us that knowing the sequence of all the "building blocks" of life is not enough, since a biological individuality has also to be studied as a self-organization whose complexity makes an organism an affective individuality capable of interacting

with the environment. Today, biology refocuses not only on the form but also on subjectivity and biological individuality, which were marginalized during the 19th century, without falling back into vitalism.

We would also like to emphasize the role played by the particular connection between aesthetics and theoretical biology, which some of the essays of this issue tackle within the framework of a dialogue between philosophy and life sciences. This aspect appears to be especially relevant in the light of the turn of aesthetics towards *aesthesiology*, which today provides a broader understanding of living forms that bypasses the traditional Aristotelian distinction between *physei onta* and *techne onta*. Again, insofar as Goethe's morphology reworks this distinction by looking at reality as such, both natural and artistic, it may be seen as providing the matrix for overcoming it. We should not forget, *en passant*, the role of German physiologist and painter Carl Gustav Carus, who was also a friend of Goethe and who adopts a morphological perspective in art, making the close relation of science and art explicit.

The present issue is divided into three main sections: the first one includes the essays of Minelli, Maggiore, Tenti, and Tahar, and analyses the nexus between morphology and evolution; the second one, including the essays of Porceddu Cilione, Ophälders, Lupo, Tedesco, Zhok, and Di Bernardo, focuses on the relationship between morphology, plasticity, contingency, and freedom; the third one collects the essays of Cusinato, Brentari, and Koutroufinis, and explores the debate stirred around the concept of organism proposed by Uexküll.

In the first section, Alessandro Minelli analyses the relation between form and development and the reasons for the impossibility to refer to a single explanatory paradigm of the living forms, starting from Burdach's question about the principles of form and according to the contemporary position which denies the possibility for considering the form as a response to a function. One cannot investigate living forms by following only the logic of biological development, nor can one explain the ontogenetic processes only through the criterion of evolution. Rather, Minelli argues for integrating both points of view as in Evo-Devo, discussing the three cardinal elements of this perspective, namely the presence of systemic changes, the modularity, and the evolvability in the living world. By stressing the role of structural constraints work-

ing as conditions of possibility for changes and transformations, Minelli points to how phenotypic plasticity, as a proper character of living organisms, shows itself even in the absence of genotypic differences. In this sense, Minelli explores the main key topic of the present issue, namely the metamorphic form of the living being, on which Valeria Maggiore's contribution also insists.

She raises the question of biological difference between imaginary creatures and only apparently fantastic existing animals that fill us with astonishment. Hence, Maggiore examines the disparity of existing animals and its reasons as well as the conditions of possibility of the formal organization regulating the emergence of morphological novelties in nature. She also discusses how the extended evolutionary synthesis relaunches the morphological perspective, focusing both on the role of the "architect genes" or "morphogenes" responsible for the ontological syntax of animal organisms and on the power of the "architectural constraints" affecting (genetic and ontogenetic, physical and historical) development of the living forms.

Gregorio Tenti's philosophical starting point concerning the role of difference, conceived to be structurally lying in Being and, hence, life, is the access key for a transcendental morphogenetic understanding of the living form beyond its biological definition and constitution. In his attempt, Tenti refers primarily to two positions, namely Bergson's metaphysics of life beyond Darwinism and Canguilhem's philosophy of the living directly influenced by the morphological tradition, thus, recomposing the complex mosaic of the tradition of biomorphological studies both in Germany and France. At the same time, he deals with two main questions in morphology, namely 1) the epistemological problem of a knowledge of the living individuals and 2) the ontological problem of the consistency of becoming. The first problem, already well-known to Goethe and Kant, stems from the dilemma: on the one hand, the individuals are non-objectual beings; on the other, morphology aims at grasping the essence of the living beings as such, or rather the «impersonal, morphogenetical a priori act» in which each living being consists. The second problem implies a reflection on notions such as temporality, spatiality, and individuality, especially referring to Ruyer's, Simondon's, and Deleuze's thoughts.

Mathilde Tahar also investigates Bergson's philosophy, which she resorts to in order to ponder the limits of strictly evolutionary explanations. She argues that evolution cannot be conceived as a process towards an optimum and, therefore, she critically discusses Darwin's solution of natural selection as a mechanistic explanation for adaptation that would imply finalism. Tahar's essay draws the reader's attention to the dynamic structure of evolution, which proceeds through maladjustments, dissonances, conflicts, absurdities, inappropriateness, and regressions. In evolution, contingency plays an essential role which reveals its historical character insofar as evolution is "duration" and not mere succession. Hence, a mechanistic conception of evolution turns evolutionary explanations into vicious circles. And, most importantly, by not taking the organisms' internal constraints into account, evolutionary explanations prove to be insufficient in order to understand living organisms. Following Bergson, Tahar draws attention to the organism's essence as something unpredictable by its own nature that expresses the complexity and the contingent intersection of different and heterogeneous levels that can be distinguished only artificially. In this sense, biodiversity depends on the process of becoming understood as «a creative spiral of novelties».

The essays of the second section of the issue focus on the creative aspect in the world of forms that depend on contingency. Several authors rework Goethe's overcoming of the Aristotelian difference between nature and art. Pier Alberto Porceddu Cilione especially devotes his essay to rethinking the concept of nature, examining how some central concepts of aesthetics can contribute to the understanding of biological life. Porceddu Cilione not only points out that the natural world and the art world are related by a unitary play of forces, but also that there is an art of nature as well as a nature of art, therefore, the rigid distinction between art and nature must be bypassed. Thus, he calls the Goethean morphology into play since Goethe looks at the totality of Being as the true object of morphology. This totality is a creating processuality, even though this raises the questions of the relationship between the form of an entity and the eternal morphological matrix of Being. Being not only mimetic but also creative, art offers a study model of form. The morphological gaze is able to cross art and nature

transversally. Therefore, morphology can provide a common ground of reflection for both art and biology, by investigating the form-of-life and the form-of-art as *Bildung*. The concept of form as *Bildung* entails an antideterministic-mechanistic understanding of form, emphasizing its "free" character, its "gift" character.

Through a morphological investigation which eliminates the ultimate distinction between nature and art, nature and culture, nature and history, Markus Ophälders' text resorts both to Benjamin's conceptual translation of the main concepts of Goethe's morphology into those of his philosophy of history and his aesthetics (for instance, the resemantization of the concept of *Urphänomen* as "origin") and to Spengler's thought. Inspired by Goethe's philosophy of nature, Spengler assumes the cultural eras as living forms and living formation processes, such as plants subject to continuous metamorphosis. Both in Benjamin and Spengler, history is thematized as a natural phenomenon. Despite the role of human actions, history is "transformed" back into nature. Furthermore, Ophälders is specifically concerned with Goethe's way of conceiving the phenomenal essence of reality, hence the manifestative trait of the *Urphänomene*, namely of those phenomena that are sensibly perceived as *Erscheinungen*. This approach allows a kind of eidetic vision of form as the original form from which the other existing forms arise, despite Goethe's terminological revision after Schiller's criticism, which leads him to replace the concept of *Urpflanze* with the motto "*Alles ist Blatt*". Even though Goethe abandons the idea that the essence can be experienced through a sensible perception, the leaf is a self-showing phenomenon that allows the knowledge of all other botanical appearances since through the leaf a form is given to the respective phenomena, a form different each time, but also consistently similar to a hypothetical original leaf. For Goethe, this kind of phenomenality is also at work in art, and, in this sense, Ophälders analyses the extension of Goethe's morphological project, which lies on a conception of form as a free givenness and manifestation.

Such a conception of form is deeply phenomenological and can also be found in Rosa Maria Lupo's essay, which investigates the question of the plasticity of form and its epistemological significance by putting metaphysics, phenomenology and morphology into a fruitful dialogue.

Lupo analyses Blumenberg's revision of the eidetic approach, which also lies at the core of Goethe's morphological project. In its attempt to understand the problem of eidetic variation by looking at some theses of biology, this approach is exposed to the risk of losing the sense of the continuous plastic morphogenesis of living beings. The problem of eidetic variation is both an ontological and an epistemological question. Indeed, the emphasis on the intelligible character of form, which is derived from the possibility of subsuming the individuals under the universal generalities of kinds and species to which they belong, implies a reduction of the role of contingency, which actually is one of the essential elements that determine ontogenetic acts and epigenetic development of the individual being at all levels of the living being, from the biological to the symbolic one. Nevertheless, renouncing the eidetic intelligibility of form draws the morphological project into question. In its constant dialogue with Goethe's morphology, Blumenberg's revisited phenomenology of the living world aims at respecting the delicate balance of chance and necessity which life consists in. It also draws on the Goethean conception of metamorphosis as a tension between a "subversive" force that tends to destroy the form and a "conservative" one, maintaining it instead.

In Salvatore Tedesco's essay, Sebald's morphological writing is a powerful sign of this dialectic tension within life between its loss and the possibility of overcoming its defeat. In this sense, Tedesco analyses Sebald's reference to Bilz and his investigation of identity, hominisation, and metamorphosis. For Bilz, human identity formation is a conflictual process concerning the very relationship between the living being – in its body and its dynamic and plastic essence – and its vital environment. In this much troubled formation process, a dialogical, metamorphic, relational sense of identity emerges. Furthermore, Bilz's psychopathological research focuses not only on the plastic dimension of the human affective world, it also examines the «reciprocal and motivated replacement of formal configurations», posing the existence of two main levels in the identity constitution of the human beings, namely the so-called *biologische Radikale* and *identische Exekutive* – which are marked by the ability both to repeat their ancestral foundation and to transform and shape a proper and autonomous inner world. Bilz's

biological-relational interpretation of the human being offers a plural and dynamic conception of organic forms and their functional systems which reveals the radical human openness to the contingency of experience and to the unrepeatable uniqueness of life and reality.

This uniqueness is also at the core of Andrea Zhok's essay, which discusses the changing character of the living being whose actions are driven by a «transformational logic» lying in a historical process. Actions are diachronic units whose meaning is fulfilled to the extent that they are embedded in a comprehensive horizon, i.e., in a story that includes three dimensions: biological, cultural, and personal. This horizon cannot be explained as a simple mechanical course. Instead, it is characterized by being «oriented towards», which determines that something has a value, a meaning for somebody. Therefore, the logic of the living beings cannot be described through an erroneous adaptationist paradigm that explains the essence of biological properties as the phenotypic traits, referring to the adaptation mechanism and hence to natural selection. On the contrary, natural selection «works on life and does not constitute life», meaning that natural selection operates through possibilities and not necessities. Zhok then discusses the meaning of the biological properties as emergent properties. These emerge in the sense that they depend on the configuration of the parts of the living being. They are relational properties in the sense that they are a meeting point between a certain given configuration of the living being and its given surrounding world. Hence, Zhok argues for a way of understanding that focuses on what a property can currently do, refusing to acknowledge that a new property's emergence is strictly determined by the old one. In this sense, it is possible to consider natural evolutionary history as «a process of progressive possibilizations». This kind of description can also be adopted both for the cultural evolutionary history and the individual life, which can be seen as a «space» of possibilization where each action has «a possibilizing character» and is «creative of new possibilities, primarily for the course of life of the agent itself». In all three dimensions, there is no deterministic order, as Mirko Di Bernardo also points out.

In his essay, Di Bernardo analyses the process of continuous autopoiesis, which is what a living system is, by following Kauffman's theory

of biological complexity, which considers highly organized living forms as plastic compromises between variability and specificity. Di Bernardo dwells extensively on the core of this theory, namely the autonomous agent defined as a physical system capable of acting for its own advantage in a given environment. According to Kauffman, an autonomous agent has a relational character, and in particular it is a relational convergence of matter, energy, and information, where information means a «quality [that is] able to generate and regulate the entire system». This feature transforms an autonomous agent into a living, cognitive, intentional system which also needs to be analysed semantically, insofar as such a system makes use of symbols and signs. Moreover, a living system is an expression of a "know-how" capacity that opens the system to the ethical sphere given that autonomous agents can act for their advantage and self-preservation according to their representations connected to meanings and values they give and behaviours and purposes they have. Di Bernardo points out the difference between simple agents and complex autonomous ones like human beings capable of good and evil, the latter entailing forms of self-awareness capable of responsibility and being able to create new meanings and make symbols in continuous processes of «production of forms» by proceeding through synthesis, cancellations, and integrations. Ultimately, life implies semantics, intentionality, and value.

As said above, despite his criticism of the morphological project, Estonian biologist Uexküll plays an important role in elucidating the relationship between the living organism and its environment. The essays in the third section of the issue are devoted in a more specific way to his position.

The project of biosemiotics emerges in Guido Cusinato's essay, which turns to Scheler's "enactive" phenomenology of the living being in his reworking of the most important concepts elaborated by Uexküll, especially that of *Bauplan*. Indeed, Scheler tries to solve Uexküll's aporia, which is also the starting point of Cusinato's inquiry, namely how the different living species can reciprocally communicate in spite of their existence in different environments. Scheler's answer is that the organism selects its *Umwelt* by «carving out» an ecological niche from the world. A «grammar of elementary expression» proper to each living

organism discloses the possibility of biosemiotic interaction between environments and living forms capable of active orientation within their own environment. The relationship between the living organism and its environment is made possible through the organism's drive structure and perceptive nature, which focuses on what is relevant to its life within the environment. The organism, on its part, determines what is relevant according to a valueception that takes place on the pre-representational level. The idea of plural environments (one for each species) and of an interaction between the species and their environments are Uexküll's legacy in Scheler's thought. Furthermore, according to the distinction between *Leib* and *Körper*, Scheler recognizes the lived body as capable of perception, i.e., of selection through inner and outer sense. Indebted to the Uexküllian notion of *Bauplan*, this perspective is the key to Scheler's «schematism of *Leib*», which he reworks enactively by stressing its «creative» as well as selective role. According to Uexküll, a living organism can create a construction plan and thereby a «magic environment», namely its significant and vitally relevant *Innewelt*, which can be thought of as a «world of semiotic markings» in which the organism acts in accordance with the biological markings it perceives as meaningful for its life. In this sense, such a world is also an operative one.

Uexküll's biological concept of *Umwelt*, his conception of a living organism as a perceptive and operative organism that can «*shape* and *share* their experienced reality», and his Kantian heritage regarding the topic of transcendental subjectivity also play a central role in Carlo Brentari's essay. Uexküll's notion of *Umwelt* is a multi-semantic one, insofar as it designates a subjective, species-specific, intersubjective, and inter-specific world. This world results from the organism's perception and action according to an anti-mechanistic paradigm of nature characterized by a teleological force (*Naturfaktor*) that allows a kind of harmony among the various needs and actions of the diverse species. In physiological, morphological, anatomical terms, the *Naturfaktor* is the construction plan, while it is subjectivity as concerns the behavioural sphere. Another central question in Brentari's essay is Uexküll's risk of solipsism due to the fact that, in his theory, the subject has the nature of a monad. Nevertheless, while Uexküll's conception has a Leibnizian

trait, a Platonic influence can be detected in the possibility of knowing the *Naturfaktor*. Similar to Plato's conception of ideas as mediators, four key functional circles play an intermediary role between the *Naturfaktor* and each living being, while the notion of *Bauplan* seems to present an Aristotelian teleological character. As a matter of fact, this Platonic aspect in Uexküll's theory emphasizes its anti-determinism and anti-mechanism, insofar as he assumes the animal's freedom to be a transcendental and semiotic way of being which discloses the possibility of action. This represents an overcoming of the Platonic paradigm «of the repetition of fundamental ideas».

The analysis of the «logic of organism» as opposed to a «logic of biological mechanism» is precisely that which lies at the core of Spyridon A. Koutroufinis' essay, which draws on the existence of *causal factors* like variables, parameters, and essential equations in order to determine the dynamic of a biological system. Causal factors can be intrinsic or extrinsic, but the peculiar trait of life is that there are no rigid borders between these factors insofar as the living organisms are dynamic ways of being constantly subject to change, thus, they are not mechanisms. Therefore, an organism is in a permanent processuality stemming from always new relations between these intrinsic and extrinsic factors. Moreover, there is also a difference between first-order and second-order intrinsic factors, the latter expressing the plasticity of the living beings and of their "fundamental organizing principle" according to which a living organism aims at the maintenance and perpetuation of its form of organization. The second-order intrinsic factor is conceived by Koutroufinis to be a process that fortifies the synergistic relationship between its elements. Individuality emerges from the «inextricable causal interweavement of its permanently occurring first-order processes». Despite the presence of constraints limiting the freedom of the living organism, Koutroufinis puts their role into perspective in order to propose a different understanding of selfhood for overcoming scientific materialism. In order to do that, he looks at Uexküll's concept of *Umwelt* in that it includes relevant aspects for the organism's life. Insofar as an organism produces a representation of its *Umwelt* thanks to its apperception process, its existence cannot be mathematically explained and, therefore, biology cannot be reduced to physics.

In publishing this issue of *Thaumàzein*, we hope that the dialogue between scholars from different disciplines will enhance an investigation of life that respects the complexity of its expressions and forms.

Guido Cusinato, Rosa Maria Lupo, Alessandro Minelli, Salvatore Tedesco