

Empirical Access to Life's Teleological Force via an Active and Co-Constitutive Relation between Subject and Object

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“In the adult state, the human being or the animal shows only one of the forms that must be passed through from the first moment of becoming. However, these are only the products of life. To understand life itself, the sharpness of glasses and knives is not enough. It wants to be slowly observed in its manifestations, and from quite different studies, from quite different regions shines the light that slowly but constantly brings these observations to greater clarity” (Von Baer, 1864, p. 82).

Abstract

This article proposes an approach to understanding life that overcomes reductionist and dualist approaches. Based on Immanuel Kant's analysis of the cognitive prerequisites of knowing an organism, I refer to an idea of Gertrudis Van de Vijver and colleagues who described a co-constitutive relationship between the cognitive activities of the observer and the living features of the organism. Using the example of a developmental series, I show that within this active and relational process, the self-generating power and teleology of the organism manifest themselves on the mental level of the observer. I posit that the Kantian mode of objectification, which refers to the sensually perceptible appearance of an organism, can be supplemented by an active mode of relational or “communicative” objectification that encompasses the life of the organism and the mind of the observer. By considering the mental processes of the observer which occur during the observation of biological phenomena, this analysis introduces a phenomenological first-person perspective on the study of life “from within”, which enables an empirical investigation of the vital properties of an organism.

Keywords

Immanuel Kant; Teleology; Autopoiesis; Organic development; Objectification; First-person perspective; Second-order Systems Theory

Introduction

We are surrounded by and entirely dependent on a biosphere of complex life, and we are living beings ourselves. But do we understand life? Can the multitude of organisms have emerged and developed in a purely material world? For most of the 20th century, this perennial problem of science and philosophy (Schrödinger, 1944; Luisi, 2006) was thought to be solved. A mechanistic interpretation assumed that organisms emerged from complex prebiotic chemistry (Pross, 2016) and then evolved as genetically programmed survival machines (Dawkins, 1976; Mayr & Provine, 1980). In recent decades, however, this conviction has been increasingly challenged (Strohman, 1997; Moss, 2004; Nagel, 2012; Sultan et al., 2021), and there is a lively debate about complementary views of life and its evolution in both biology and

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philosophy (Rosslenbroich, 2014; Laland et al., 2015; Walsh, 2015; Noble, 2016; Nicholson & Dupré, 2018; Walsh, 2018; Gambarotto & Mossio, 2022; Gambarotto & Nahas, 2023; Walsh & Rupik, 2023).

A significant part of the debate revolves around the theory of autopoiesis (Maturana & Varela, 1980; Luisi, 2003), enriched with the related concepts of organismal autonomy (Moreno & Mossio, 2015), intrinsic purposiveness (Nicholson, 2013; Mossio & Bich, 2014), agency (Okasha, 2024; Virenque & Mossio, 2024) and adaptiveness (Di Paolo, 2005). Although the theory has made significant progress in defining the properties of a minimal autonomous system/organism (Ruiz-Mirazo et al., 2004; Razeto-Barry, 2012; Soto et al., 2016) and inspired deep theoretical analyses (Kauffman & Clayton, 2006) and intensive experimental research (Luisi, 2006; Hanczyc, 2020), artificial creation of living systems in a bottom-up approach is still impossible (Porcar et al., 2011; Chang et al., 2023) and the related question of the origin of life remains unsolved (Sutherland, 2017; Lane & Xavier, 2024; Preiner et al., 2020). Therefore, it is still unclear how the living can arise from the dead. As long as nature is seen as consisting solely of dead matter, the problem of life appears to be unsolvable.

Thus, another way to explain life ontologically has been derived from inner, existential experience of being alive. This phenomenological first-person approach was particularly advocated by Hans Jonas (Jonas, 1966), but also by other thinkers (Russell, 1930; Weizsäcker, 1933; Spaemann & Löw, 1981). It has been argued that our inner experience does not only give us an immediate intuition of our own strivings, but also provides an understanding of other organisms (Weber & Varela, 2002). However, such transfer has also been criticized as unscientific anthropomorphism (Villalobos & Ward, 2016). The inner perspective provides a general feeling of life, but it does not facilitate empirical observation of the self-generating, teleological force of other organisms. However, if we want to ontologically ground organismic life in nature, we must observe it. So is it possible to gain empirical access to the forces that generate organisms?

Here, I suggest an approach which opens the possibility of empirical and detailed observation of an organism's self-organizing forces and teleological development in a first-person phenomenological perspective. My argument unfolds in six steps. In section 1, I outline Immanuel Kant's critique of cognizing an organism and show that it provides the basis for an extended perspective on the organic. In section 2, I refer to work of Gertrudis Van de Vijver and colleagues (Van de Vijver et al., 2005; Van de Vijver & Haeck, 2024) who argued that organic life must be "objectified" in a different way than material objects. In section 3, I demonstrate this different mode of objectification with the example of a botanic developmental series, thereby showing phenomenological access to the formative force and teleological organization. In section 4, I draw on Van de Vijver again who argued that in relation to organisms, subject-object dualism must be overcome in favor of a communicative approach. In section 5, I discuss this approach as a different mode of objectification compared to physical objects, and in section 6, I give an outlook on an extended ontology of nature. Finally, I compare this approach to Hans Jonas' notion of an inner "feeling of life" and discuss the problem of anthropomorphism. In summary, I suggest a new understanding of the notion that life can be known through life.

1. Significance of Kant's analysis of the organism-problem

Autopoiesis, autonomy, agency and teleology of living organisms are difficult to explain in physico-chemical terms. Material entities act on each other from the outside, while an organism "is able to perform a creative activity on itself, being not the product of exogenous forces, but of an internal action of self-production" (Bich & Damiano, 2007, p. 462). The problem was clearly described by Immanuel Kant in his *Critique of Judgment* (Kant, 1790/2008). He showed that we have to think of organisms as self-producing, teleological organizations because otherwise, we could not make any sense of them at all. We simply cannot conceive of a bird's organization as assembled by chance (*ibid.*, p. 360). In addition, we must assume an intrinsic, self-forming power, by which an organism can be distinguished from a machine (*ibid.*, p. 374). Without this idea, we could not link different organic forms; i.e., we would be unable to relate a bird to its egg. Organisms

are not only spatially but also temporally integrated wholes, and both organic structure and development presuppose the idea of a self-forming whole.

Since wholeness cannot be perceived through the senses, teleology and self-formation can be conceived of only in terms of “ideal causation” (ibid., p. 373). Purposiveness, therefore, is an “ability to act, which is determined by concepts”, which “even to know it empirically with respect to its cause and effect presupposes concepts of reason” (ibid., p. 369-370).

Importantly, Kant was not arguing about the ontological possibility of a living being but about the problem of understanding it – “even to know it empirically”. Organisms are certainly possible in nature, but how do we make sense of them? Kant did not focus on the living object, but on *knowing the object*. And being aware that the form of knowledge determines its content, Kant did not even focus on this content (i.e., the *idea* of a living organism) but on the conditions of its knowability. In the case of an organism, this condition is to imply “concepts of reason”. Thus, Kant’s question was not whether an organism is teleological in itself or not, but how we know about its teleology. This epistemological turn in the philosophy of biology has two important implications.

First, it is simply not possible to conceive of an organism without knowledge of its teleological and self-generating wholeness. Even if this knowledge is not explicitly stated, it is always implied. Therefore, attempts to interpret organisms in mechanical terms or to model them as physico-chemical machines nevertheless presuppose this implicit knowledge.²

Second, Kant had shown in the *Critique of Pure Reason* that the conditions of knowability of an object determine how the object appears to us: “The conditions of the possibility of experience in general are at the same time conditions of the possibility of the objects of experience” (Kant, 1787/1998, p. B 197). Kant made this especially clear with regard to the concept of causality:

“[E]xperience itself, i.e., the empirical cognition of it, is only possible because we subject the sequence of phenomena and thus all change to the law of causality; consequently they themselves, as objects of experience, *are only possible according to this law*” (ibid., p. B 234) (italics added).

This sentence could be transformed to apply it to the development of an organism. It then would read: The empirical cognition of an organism is only possible because we subject the sequence of its appearances and thus its development to the law of teleology; consequently, an organism by itself, as an object of experience, is only possible according to this law.

Thus, when we think of an organism, we imply its teleological and autopoietic organization because this is a necessary condition for experiencing the (living) organism at all. However, these implicit “concepts of reason” are often not consciously reflected upon. Kant’s lasting contribution to the philosophy of life is that he made this implication and its necessity fully conscious. Can we follow Kant – and even go beyond him – not only to become conscious of the general necessity of teleological thinking with respect to an organism but also to awaken ourselves to *how* we think teleology and organic development concretely and vividly?

2. Another mode of objectification

If we think of objects, we usually refer to physical items that we perceive through the senses. However, according to Kant, the manifoldness of sensual impressions cannot by itself create the unity of an object.

² Maturana and Varela originally attempted to interpret organisms as “living machines”: “Our approach will be mechanistic: no forces or principles will be adduced which are not found in the physical universe. However, our problem is the living organization, and therefore our interest will not be in properties of components, but in processes and relations between processes realized through components” (Maturana & Varela, 1980). – In his seminal book *Mind in Life*, Evan Thompson reported on his personal communication with the late Varela: “[Varela] indicated that as time had gone by he had come to have a ‘broader view’. He had begun to see that ‘in a funny way you do recover a full fledged teleology ... but this teleology ... is intrinsic to life in action’. (...) In other words, teleology, in the sense of self-organized, intrinsic purposiveness, can be seen as a constitutive feature of the organism, (...) rather than only a form of our judgment, as Kant had held” (Thompson, 2007, p. 454). – According to my interpretation, “seeing” purposiveness as a constitutive feature of the organism already means to imply “concepts of reason”.

Therefore, such objects are not just “out there” but are constituted within the process of cognition. With respect to the material world, objectification is achieved through the unification of sensual impressions with a priori concepts.

“The combination (...) of a manifold in general can never come to us through the senses, and therefore cannot already be contained in the pure form of sensible intuition; for it is an act of the spontaneity of the power of representation, and since one must call the latter understanding, in distinction from sensibility, all combination, whether we are conscious of it or not, (...) is an action of the understanding, which we would designate with the general title synthesis in order at the same time to draw attention to the fact that we can represent nothing as combined in the object without having previously combined it ourselves, and that among all representations combination is the only one that is not given through objects but can be executed only by the subject itself, since it is an act of its self-activity” (ibid., p. B 129-B 130).

This important thought should be a mantra for all natural sciences, because it makes the scientist aware of his own active role in the creation of the objects to be observed. It furthermore draws attention to the fact that even “physical objects” are not purely material but always comprise a mental (conceptual) component. Kant thus asks us to focus our attention not only on the content of the external world, but also on the way in which and under what conditions this content appears in our consciousness. We must therefore consider not only what is observed, but also the constitutive role of the observer.³

With regard to organisms, we face the specific – and potentially confusing – problem, that objectification (“combination of a manifold of sensual impressions”) is possible for their physical appearance but not for their organizing life. We cannot observe the purposiveness of a bird’s organization as we observe its wings, feathers, or bones. This is especially true for organic development. One cannot observe an egg, a chick or a hen in the same place at the same time but has to actively combine the perceptions of these different stages by the concept of teleological development due to an internal, formative force. Teleological life cannot be objectified in the same way that we objectify physical objects. Living organisms “intrinsically resist objectification” (Van de Vijver et al., 2005, p. 58). This resistance has been the reason for vitalistic theories as well as for all attempts to find mechanistic explanations for life. While mechanistic explanations are contradictory in themselves, vitalistic theories are based only on theoretical inferences and cannot be confirmed by observation. However, if one considers the possibility of *another mode of objectification*, observation of teleological organization and formative forces may become possible. To demonstrate this idea, I refer to the work of Gertrudis Van de Vijver and her colleagues.

According to these authors, the “slightly dramatic presence of living organisms in the world” (Van de Vijver & Haack, 2024, p. 76) generates “recurrent ‘moments of crisis’ of the logical realm prevailing in the modern sciences” (ibid., p. 61) and, thus, throws us back to the question of our own cognition. The problem of understanding the organism requires

“the conceptual space... (to) change gear, moving from ‘knowledge about the object’ to ‘knowledge about knowledge’. The attention to the organism appears to be the point where the conceptual space is compelled to investigate its own structural procedures and dynamics –, i.e., (...) to fold back onto itself” (ibid.).

With this notion, Van de Vijver and colleagues are in clear agreement with Kant. However, in contrast to Kant, they do not stop at this point. Instead of “[settling] into the safe home base of the regulatory use of the principles of knowledge” (Van de Vijver et al., 2005, p. 66), i.e., the Kantian notion “as if”, they proceed to a constructive solution. They posit that knowledge about the organism differs from knowledge about physical objects in that it results from a “co-constitutive” relation between the knowing subject and the living object. Co-constitution means that

³ In the theory of autopoiesis, this epistemological turn has been empathically advocated by Heinz von Foerster with his theory of “second-order cybernetics” (Foerster, 2003; Froese, 2010, 2011); cf. discussion.

“the knowing subject participates in the purposive essence of living systems by adding his own directionality. Any knowledge of living systems bears witness to both forms of directionality or purposiveness, linked, respectively, to observer and observed” (ibid., p. 67).

The idea is that we only know of the teleological organization of an organism by actively adding (the authors call it “supplementing”) purposiveness to our cognition of it. This “supplement of meaning” (ibid., p. 65), however, is not merely subjective because purposiveness is the essence of the organism.

According to these thoughts, one can say that the concepts of purposiveness, autopoiesis, agency, autonomy, etc., are not just being applied as merely regulative principles. Instead, they correspond to an ontological side of the organism that is not perceivable through the outer senses but reveals itself *within the cognizing activity* of the knowing subject. Van de Vijver et al. therefore complement the Kantian concept of objectification by claiming an expanded “ontological space”, which is not only constituted by sensual impressions and determining concepts but also by a relational and conditional *communication* between the knowing subject and the known (living) object. These considerations lead the authors to the notion that

“whereas Kant saw the resistance of living systems to processes of objectification as an intrinsic obstacle to be overcome, here it is taken as the *means par excellence on the basis of which living systems can and will reveal their specificity and uniqueness*” (ibid., p. 67) (italics added).

I consider this idea to be quite revolutionary, because it points to the possibility of actually observing the “specificity and uniqueness” of an organism, i.e., its teleological organization and self-forming forces. That is, to empirically solve the riddle of life.

3. *Creational supplementation of a developmental series*

In agreement with Kant, Van de Vijver et al. claimed that to understand an organism, the knowing subject must actively supplement teleological meaning to the physical appearance of the organism. However, they go beyond Kant with their notion that this supplementation opens up a new “ontological space of conditionality”, a space “of experience on the one hand, and of objective knowledge on the other hand” (ibid., p. 60-61).

In order to demonstrate these issues, I would like to insert a concrete example. Consider the ontological development of an individual plant leaf (Figure 1). What are the conditions on the side of the object and on the side of the subject that are required to address these images as a developmental sequence? One perceives different, individual shapes, and one knows that they are sections from a continuous sequence of shape change. However, one cannot observe the process of shape transformation between the depicted shapes. This process is supplemented by the knowing subject. While the shapes are perceived, the process that connects them is created – or rather, it becomes manifest by being created. This creation, however, although entirely dependent on the subject’s activity, is not arbitrary. One knows exactly how to change one form to arrive at the next. For example, to move from the 5th shape to the 6th, one has to expand and somewhat round the blade, enlarge the small, two-sided extension beneath the blade, add another one, and prolong and thin the petiole. All of these procedures require the active engagement of the subject. One subjectively creates the same shape changes as the plant objectively does. Thus, the *condition of experience* of these developmental changes is that one actually creates them. The experience of the objective procedure requires its subjective production.⁴

⁴ Even if one does not actively perform the shape changes in one’s imagination, the implicit knowledge about these dynamical changes guides the observation of the developmental sequence. Without this knowledge, the images would make no sense to us.

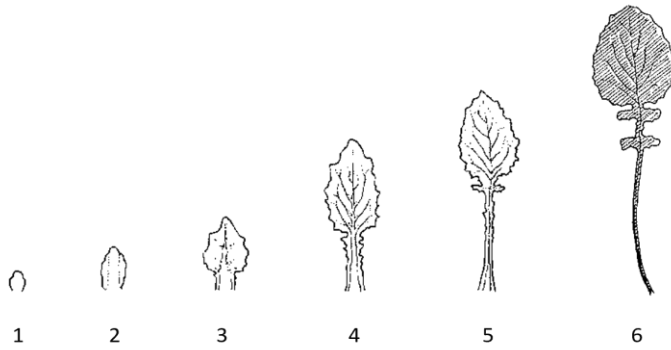


Fig. 1: Sketch of the developmental stages of an individual leaf from common nipplewort (*Lapsana communis*) (Bockemühl, 1982).

A similar consideration applies to the *teleology* of development. Leaf buds (1) have the potential to develop into fully grown leaves (6); thus, the latter is a teleological goal of the former. The molecular, biochemical and cellular processes in the bud only occur *because* they are the basis for further leaf development. The molecular and biochemical structures and processes are subject to physico-chemical laws that can be objectively determined. However, the teleological meaning of these processes and their organizational relations cannot be recognized through an objective analysis of the processes themselves. This meaning must be supplemented by the subject. Nevertheless, this approach is not subjective (in the sense of non-ontological), because the described processes are surely the basis for and will (if undisturbed) lead to further development of the leaf. The teleological meaning of the molecular processes in the leaf bud is therefore not objectifiable in a classical sense but manifests and can be experienced as ontologically efficacious *within* this subjective supplementation.

Thus, the active creation of the dynamic transitions between the forms in Figure 1 is the condition for their *experience*, and the supplementation of the teleological meaning is a condition for their *understanding* (there are others, too).

4. Objectification in the physical and organic realm

According to Kant, the conditions of appearance and comprehension of physical objects involve the merging of a manifoldness of sensual perceptions with unifying concepts through the activity of the subject. By this procedure, the contingent manifoldness of perceptions is being “objectified”.

The important point is that what we call “physical objects” is not in itself something “out there” that exists independently of our observation, but something that depends on the process of cognition. To realize this dependency, we must shift our attention from its usual fixation on an assumed, external reality to observing the content and processes on the stage of our consciousness. It is Kant’s lasting merit to have done this in a systematic and conceptually clear way. In this perspective it becomes clear that so-called “physical objects” are being generated by applying unifying concepts to a contingent and even chaotic manifoldness of sensual impressions. Out of this apparent manifoldness we generate “objects” – unified and fixed entities as figures separated from their perceptual surroundings – by applying concepts like “form”, “size”, “color”, or, more specifically, “sky”, “tree”, “house”, etc.⁵ The process is comparable to using a cookie-cutter on plain dough. Before applying the conceptual cutting, we are dealing with an unstructured mass; after the cutting, we are left with a specific object. Although the sensual manifoldness is permanently fluctuating and changing, the generated “objects” appear as relatively fixed. This is due to the fact that the concepts which we use to process sensory impressions are defined, fixed and dead in themselves. The “tree” is always a “tree”,

⁵ To be sure, such concepts are not names for pre-existing entities, but forms that generate these entities in the first place.

regardless of whether the content of my sensory perception is a tangle of dark branches or a full, green crown. Therefore, “physical objects” appear with precisely these properties: defined, fixed and dead. In summary, what we call a physical object is a combination of two mutually interpenetrating factors: contingent sensual impressions and unifying concepts within our consciousness.

Living entities – “organisms” – also initially appear to us as a chaotic manifoldness of sensual impressions, which we have to conceptually unite in order to become aware of them. Thus, we initially apply the mode of objectification which we also apply to generate other physical objects. However, what we generate in this manner as a fixed entity changes by itself. Thus, we have to change the conceptual side of the object, too. By doing so, we soon realize that the “object” changes in a lawful way, it “develops”. In order to follow this continuous change, we have to continuously change the conceptual side of the developing object (e.g., we need to change the concept “egg” into the concept “chick”). We ascend from fixed entities to dynamically and continuously developing entities. This dynamical change in itself cannot be fixed (“objectified”); it can only be done. Therefore, we need to apply “living” concepts, i.e. concepts with an intrinsic capacity to change, in order to grasp (“objectify”) development. This mode of objectification, however, does not lead to something fixed and perceptible as an intuition of the outer senses, but to something which can be perceived as a dynamical process as an intuition of our “inner sense”. Intuitions and concepts are not separated in this inner experience, and they change dynamically within and through the imaginative activity of the knowing subject.

Van de Vijver et al. even claim that such dynamical, communicative or co-creative objectification opens an ontological space which is different from the ontological space of physical objects. Whereas the ontological space of physical objects is determined by fixed concepts, living objects – better: living, organizational processes⁶ – reside in an “ontological space of conditionality”, which is determined by the interaction of the changing organism with the inner imaginative activity of the knowing subject. Put into simpler words, we can perceive the lawfully organizing forces of life within our inner, co-creative activity as an ontological reality.

If we objectify a physical object, we separate it from the ourselves as subject. Its object-status does not require our continuing activity. One could say that we actively (but unconsciously) place the object into what appears to us as the outer “objective world”.⁷ This kind of objectification, however, does not work for living beings. Of course, their material structures and properties can be objectified in this way, but not their living, teleological and self-forming organization. According to Van de Vijver et al., Kant opened up the perspective of a different mode of objectification for living systems:

“Most innovating is Kant’s assumption that living systems intrinsically *resist* any attempt of objectification, and demand as such for an approach qualitatively different from the one developed in relation to non-living systems” (Van de Vijver et al., 2005, p. 58).

Apparently, objectification is something different in biology than in the physical sciences. In biology, subject and object are more closely related to each other, as it were. They communicate.

With respect to the properties of organisms that are perceivable through the senses, the first (Kantian) mode of objectification can be applied. Through this approach, the subject comprehends what is physical about biological objects (Fig. 2, left). However, this is only their non-living part (that which remains of them at the moment of death). To comprehend the life of an organism, *another mode of objectification* must be added. In this mode, the subject does not entirely separate from the object but remains actively involved in its comprehension. At the same time, the activity of the object (its life) remains somewhat more within the *process* of being objectified, as it were. In the relational “ontological space of conditionality” of biology, both the subject and the object change their status: the subject becomes more active and creative, and the object

⁶ This idea is reminiscent of the process ontology of Whitehead and his followers, which cannot be discussed here.

⁷ Van de Vijver & Noé wrote: “As the third (...) Critique can show, there is objectivity to the extent that an object is produced, in a very specific way, from within a living, contingently based, conditionality: an object is that which has been successfully ‘pushed outside’ of the sphere of the contingently based, largely implicit, practices of living subjects” (Van de Vijver & Noé, 2011, p. 98).

becomes less passive, particular and dead. This mode of objectification is “the means par excellence on the basis of which living systems (...), reveal their specificity and uniqueness” (ibid., p. 67) (Figure 2, middle). – To be sure, the second, relational and organismic mode of objectification does not replace the first, physical mode in biology but must be added to it (Figure 2, right).

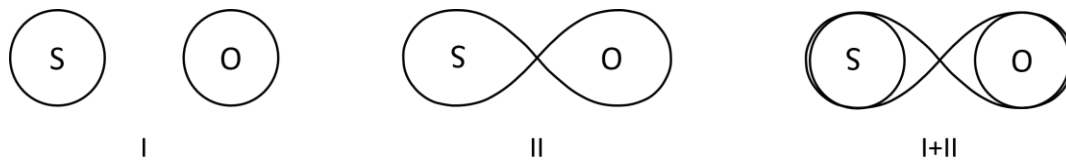


Fig. 2: Two different modes of objectification and their combination in the cognition of living organisms. S = subject, O = object.

As long as one only applies the first mode of objectification, one might say with Goethe, “To know and note the living, you’ll find it/Best to first dispense with the spirit:/Then, with the pieces in your hand,/Ah! You’ve only lost the spiritual bond”⁸ (Goethe, 1808, p. 208). Applying the second mode provides this “spiritual bond”.⁹

In summary, I propose that the living, formative and teleologically organizing forces that are essential to an organism are not only epistemological requirements, but ontological realities. However, the recognition of these forces is not the result of a dualistic attitude aimed at reviving theoretical vitalism but rather is seen as a scientific approach since these forces can be experienced and studied within our own complementary mental activity.

5. *Life itself as an empirical area of research*

Biology as physico-chemical science provides a multitude of facts about all levels of the organic, from molecules to eco-systems. This field of research has provided a tremendously broad and deep knowledge of the living. However, this research lacks a conscious and methodically reflected approach to the inner essence of the living. It deals with wholes, but it cannot understand them. And so essential, holistic aspects of the organic elude the researcher’s gaze, aspects that are directly related to the essence of the living. These comprise the specificity of organic forms, the differences between life and death or between health and sickness, and the question how is the living is connected to consciousness, to name but a few. Research that focuses on the inner, mental experience of organic processes and laws can open up ways of answering such questions. Biology can extend its methods towards scientific observation of the mental procedures that accompany and link the physically observed biological facts.

In contrast to physico-chemical observations, the study of the holistic aspects of life requires a more active engagement of the observer and an inner observation of the mental phenomena that occur through this inner activity. Van de Vijver and Haeck emphasized that organisms cannot be captured as if they “exist independently from *our doings*” (Van de Vijver & Haeck, 2024, p. 66).

⁸ Wer will was Lebendiges erkennen und beschreiben,/ Sucht erst den Geist herauszutreiben;/ Dann hat er die Teile in der Hand,/ Fehlt, leider! nur das geistige Band.

⁹ Interestingly, at the same time as Kant was writing his *Critique of Judgment*, Goethe was working on his text *Metamorphosis of Plants* [*Versuch, die Metamorphose der Pflanzen zu erklären*] (Goethe, 1790, 1817, 1831). Both works were published at Easter 1790. Goethe used the method that I describe here for the observation of the forces and laws of life (Amrine et al., 1987; Bortoft, 1996; Förster, 2012).

“Instead of referring to a knowing subject that develops knowledge *about* something, [the reciprocity between knower and organism] indicates, from within an *organic dynamic*, (...) a folding back onto *certain activities* (sensible and conceptual ones)” of the subject (ibid., italics added).

The life of organisms can be observed through the lively engagement of the cognizing human mind. It is the *cognitive activity* of the knowing subject with which it supplements the *vital activity* of the organism. While the Kantian mode of objectification allows the knowing subject to remain in a largely passive attitude, the second, organismic mode of relational objectification requires the active engagement of the subject. Understanding life is not a matter of knowing about a fixed object but about a (lawful) activity. This activity, although carried out by the subject, is not arbitrary, since it is guided by the natural phenomena (as shown in the discussion of Figure 1). Thus, the first-person phenomenology of this supplementary activity opens up the field of empirical research into the forces and laws of the living.

When one perceives an organism, one only sees (touches, tastes, smells, etc.) the *products* of its living activity. Life itself cannot be perceived through the senses. It is in fact supersensible, and yet it is a definitive reality. Nature, therefore, appears to be more than dead matter alone. However, although being supersensible, life is not something strange and mysterious but rather a reality that can be clearly experienced and described. My analysis shows how *life itself*, in its intrinsically organizing and forming force, can become an object of empirical research. To do so scientifically, one must observe and analyze “the types of engagement of the knowing subject” (Van de Vijver et al., 2005, p. 68) when this subject actively participates in the co-creation of the myriad of different forms and processes in which life manifests itself.

6. Outlook on an extended ontology of nature

The fact that the living, teleologically organizing forces of an organism cannot be objectified in the sensual, Kantian mode is only one half of the organism-problem. The other is the question of how living organisms are possible if nature is only conceived materially. Kant precisely stated this problem:

“[T]he universal idea of nature, as the sum of objects of the senses, gives us no reason whatever for assuming that things of nature serve one another as means to ends, or that their very possibility is only made fully intelligible by a causality of this sort. (...) [For] we do not take [nature] to be an intelligent being” (Kant, 1790/2008, p. 359).

The assumption that nature consists only of the sum of sensory objects, i.e., that it is only material, does not allow us to think of the possibility of living beings within it. Therefore, this assumption is probably not sufficient. I suggest to consider an additional (or extended) ontological space of nature that cannot be perceived through the senses: the woven and ever-weaving, intrinsically intelligent web of life.¹⁰

Van de Vijver et al. emphasized that the knowing subject is *free* to choose whether it wishes to “communicate” with the living organism or not. It can indeed “choose to deny the need for connecting with living systems” (Van de Vijver et al., 2005, p. 65). However, it is precisely through this possibility of choice that the subject can relinquish his or her relatively passive position in relation to physical nature and become a free and responsible co-creator in the web of life. We can try to look at organisms as mechanisms (although without success), but then we miss their essential property, namely, that they are alive. Ultimately, this is a question of life rather than of logic, not of true or false but of healthy or sick.

¹⁰ Thomas Nagel in his much-debated book *Mind and Cosmos* argued for a cosmological “teleological hypothesis”: “The teleological hypothesis is that these things [evolving organisms] may be determined not merely by value-free chemistry and physics but also by something else, a cosmic predisposition to the formation of life, consciousness, and the value that is inseparable from them” (Nagel, 2012, p. 123). Kant himself felt the need to integrate his epistemological analysis of organic teleology into the systematic unity of nature. In his *Opus postumum* he developed the idea of “moving forces” inherent in matter which encompass organizing forces (Förster, 2000).

Discussion

Biology has accumulated an enormous amount of knowledge about the complex and intricate organization of life. However, the question “How can we understand a living organism?” remains unanswered. It is clear that a scientific answer cannot be given by mere theoretical speculation, but only if the answer is based in addition on phenomenological observation. Here, I argue that we have a two-fold observational access to the living organism: (i) observation of its physical properties through the outer senses and (ii) observation of its processual and teleological, self-generating holistic life-forces and organizing laws through our inner sense of mental awareness. These two modes differ in several aspects but must ultimately complement each other.

The two modes involve different ways of objectifying the observed. The first mode unifies outer sensual perceptions with a priori concepts and therefore leads to the observation of separated, “objective” details. The second mode mentally reproduces the dynamic life processes and organizational relationships of an organism and observes them *within* this activity. The two modes, therefore, require different activity on the part of the observing subject. In the first mode, the subject is predominantly passive (the activity of the observer in uniting perceptions with concepts is usually not perceived), while the second mode requires conscious and continuous mental activity. Furthermore, the two modes entail different subject-object-relations. Whereas in the first mode the objects appear to be separate from the observing subject, in the second mode there is a close, “communicative” and “co-creative” relationship between subject and object. Finally, although both types of objectification are based on the unification of perceptions with concepts, they differ in that in the first mode these perceptions come from the outer senses, while in the second mode the perceptions are made through the inner sense.

The importance of inner perception (observations within the field of consciousness) for the understanding of the living has been emphasized by various thinkers (Russell, 1930; Weizsäcker, 1933; Jonas, 1966; Spaemann & Löw, 1981) and has been incorporated into the discussion about the nature of the living organism (Thompson, 2007). Andreas Weber and Francisco Varela, for example, have proposed a connection between the theory of autopoiesis and our inner perception of bodily needs and aspirations, which they see as a justification of teleology as naturalistic causality: “It is actually by experience of *our* teleology – our wish to exist further on as a subject, not our imputation of purposes on objects – that teleology becomes a real rather than an intellectual principle” (Weber & Varela, 2002, p. 110). However, this connection is quite general. Although it provides an experience-based background for the idea of purposefulness, it does not provide access to the concretely acting, shaping and organizing forces of an organism. In other words: One cannot empirically observe the teleological, self-forming forces of an organism in this way, but can only deduce them from one’s own needs in a very general sense. And so, despite all the agreement between the theory of autopoiesis and inner, bodily experience, this approach remains an anthropomorphic projection, the validity of which is debatable (Villalobos & Ward, 2016).

Here I describe a different approach to answering the question of the possibility of a direct observation of organic formative forces by comparing the epistemological conditions that are necessary for the cognition of the inorganic and the organic. On the basis of Immanuel Kant’s analysis of the cognitive process and the epistemological preconditions of knowledge of living organisms, I posit that this knowledge already implicitly contains the realization of a teleological formative force, but that this force is not consciously experienced as an observable phenomenon. Furthermore, I try to show that the formative force (as well as the purposefulness that determines them) can become a vivid experience when the organic formative processes are actively re-created within the conscious imagination of the observer. I emphasize that this active production is not arbitrary, but facilitates objective observation, because it simply re-creates the natural organic phenomena. Thus, I argue that observation of the objective formative force is possible within the productive activity of the subject. The knowing subject produces the content of its experience, but this production is no phantasy, but re-creation. This mode of cognition could also be described as productive-receiving. It is “communicative” (Van de Vijver et al., 2005). And just as in successful

communication all the detailed and nuanced utterances of the other person resonate in the consciousness of the listener and are answered by his inner activity, this type of productive-receptive communication allows the infinite details of the organic in their formative forces and determining laws to be made conscious and observed by the recreating observer. With these arguments I hope to have justified that this kind of cognition of organic forces and laws is not an unscientific, anthropomorphic projection, but an empirical and detailed research method with which one can seek answers to the as yet unsolved riddles of life.

These considerations have many references (including some critical differences) to the philosophy of the organic, e.g. of Schelling and Hegel (Illetterati & Gambarotto, 2020, p. 116), to Husserl's (Staiti, 2014), Merleau-Ponty's (Thompson, 2007) and Hans Jonas' (Gambarotto, 2020) phenomenology as well as to some aspects of vitalism (Donohue & Wolfe, 2023) and Bergsonian and Whiteheadian process ontology (Koutroufinis, 2023), not all of which I can discuss. However, mention should be made of second-order systems theory (also known as second-order cybernetics), which has its origins in the works of Heinz von Foerster and others (Scott, 2004; Froese, 2010). Von Foerster pointed out that the scientific tradition of leaving out the observer from the observed suffers from a "cognitive blind spot", but that it "[does] not see that it [does] not see" (Foerster, 2003, p. 283). In addition, he claimed that "something that cannot be explained – that is, for which we cannot show a cause or for which we do not have a reason – we do not wish to see. In other words, something that cannot be explained cannot be seen" (ibid., p. 284). These notions perfectly agree with my analysis of the problem of cognizing life: As long as we leave our observing mind out of the picture, we do not see the field on which life itself can be seen. Von Foerster also implied that the required epistemological turn is a matter rather of existential life than of theoretical consideration: "Some of us who cannot – by their life – pursue any longer the flawless, but sterile path that explores the properties seen to reside within objects, (...) turn around to explore their very properties seen now to reside within the observer of these objects" (ibid., p. 284-285). This not only leads to a novel scientific approach, but also to a new accountability: "We have to observe our own observing, and ultimately account for our own accounting" (ibid., p. 285).

In summary, I propose an empirical solution to the problem of living organisms. The self-generating life and purposiveness of an organism can be experienced and analyzed as ontological realities in a mentally active, first-person phenomenological perspective. The empirical application of this methodology may facilitate the development of a unifying, general concept of the living organism (Hueck, 2024) and may ultimately lead to a more appropriate practice in all those areas, e.g. health, agriculture, biosphere, and many others, which are dealing with life itself.

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