9 The organism and its *Umwelt*

A counterpoint between the theories of Uexküll, Goldstein, and Canguilhem

Agustín Ostachuk

1 The living and its milieu

The most explicit and detailed account of Uexküll's concepts in Canguilhem's work can be found in "The Living and its Milieu," one of the philosophical chapters of his book *Knowledge of Life*, published in 1952. This book collects various conferences delivered by Canguilhem, with only one previously unpublished text added as Introduction under the title "Thought and the living." The chapter "The Living and its Milieu" was originally a conference presented at the Collège Philosophique in Paris in 1946–47 (Canguilhem 2001). This was only three years after the publication of his first book, *The Normal and the Pathological* (1943), in which he studied and interpreted Kurt Goldstein's main work, *The Organism: A Holistic Approach to Biology Derived from Pathological Data in Man* (1934). In this text, Goldstein quotes Uexküll many times. It is then probable that Canguilhem was first acquainted with Uexküll's theories through Goldstein. In fact, in "The Living and its Milieu," Canguilhem deals with both their theories together. According to Canguilhem, Uexküll and Goldstein reverse the problem of the organism–milieu relationship, as they claim that characteristic of the living is to make a milieu for itself whereas the study of a living being under experimental conditions is to impose a milieu on it.

Canguilhem explains and distinguishes first Uexküll's concepts of *Umwelt*, *Umgebung*, and *Welt*. For Canguilhem, the *Umwelt* designates "the milieu of behavior proper to a certain organism"; the *Umgebung*, "the banal geographical environment"; and the *Welt*, "the universe of science" (Canguilhem 2008, 111). The *Umwelt* is "an ensemble of excitations, which have the value and signification of signals" (Canguilhem 2008, 111). The living does not react to all the physical excitations of the environment but only to those of which it is notified and which presuppose a previous interest. In this manner, the excitation comes ultimately from the subject and is anticipated by their attitude. In this regard, Canguilhem states that "a living being is not a machine, which responds to excitations with movements, it is a machinist, who responds to signals with operations" (Canguilhem 2008, 111). Consequently, among the almost unlimited number of excitations from the environment, the organism only detects some signals [*Merkmale*]. One could then say that the *Umwelt* is an "elective extraction from the *Umgebung*, the geographical environment" (Canguilhem 2008, 112). As the core of this *Umwelt*,

then, one finds a subjectivity that organizes the milieu, centered according to the vital values that constitute the subject itself. To exemplify this, Canguilhem cites Uexküll's account on the *Umwelt* of the tick (Uexküll 2010, 44; Ostachuk 2013).

Of all the stimuli that could exist in the environment of the tick, only three of them have relevance for it and make up its world. After mating, the adult female climbs, guided by the photo-receptiveness of her skin, to the branch of a tree and waits. This is the first stimulus. She can wait, immobile and inactive, without feeding or taking refuge, up to eighteen years: only the right stimulus can take her out of that state of quiescence and start her up again in her life cycle. When a mammal passes under the tree chosen by the tick as a hunting post, she lets herself drop, guided by the smell of butyric acid secreted by the perspiration of the animal. This is the second stimulus. When she has fallen on the animal, she fixes onto it in response to the temperature of its blood. This is the third stimulus. Once fixed to the animal, she goes to the source of the heat, arriving at areas of the animal free of hair, and finally sucks its blood. Only when her stomach is full of blood does a biological response begin, which consists of releasing the spermatozoa that were encapsulated in the female and fertilizing the eggs that await in the ovary. Consequently, the tick can fulfill her life cycle in a few hours, after which she dies, having been able to wait up to eighteen years. During that long period of waiting and inactivity, nothing that may surround the tick has any meaning for her. Only the three stimuli mentioned earlier have meaning for her and constitute her *Umwelt* (see Uexküll 2010, xx).

Canguilhem then goes on to compare this theory with Goldstein's. Goldstein starts from the criticism of the mechanical theory of reflexes. The reflex is not an isolated reaction but is always a function of sense and orientation, which depends on the signification of a situation as an ensemble. In this respect, an animal in an experimental situation is in "an abnormal situation, a situation it does not need according to its own norms; it has not chosen this situation, which is imposed on it" (Canguilhem 2008, 113). An organism is never equal to the theoretical totality of its possibilities, but it has its own privileged behaviors that respond to its own vital norms. For Goldstein, the relationship between the organism and the environment is established as a debate [*Auseinandersetzung*, coming to terms] "to which the living brings its own proper norms of appreciating situations, both dominating the milieu and accommodating itself to it" (Canguilhem 2008, 113). The relationship does not consist then in a struggle or opposition, the latter concerning rather a pathological state: "The situation of a living being commanded from the outside by the milieu is what Goldstein considers the archetype of a catastrophic situation" (Canguilhem 2008, 113). To live is to organize the environment from a center of reference, and a healthy life is a life relying on its existence and its values. For Canguilhem, the organism is a being with sense and its individuality is a character in the order of values.

2 Uexküll: *Umwelt* and conformity to a plan

Uexküll proposes "a walk into unknown worlds" (Uexküll 2010, 41), worlds strange to us but known to other creatures, "as diverse as the animals themselves"

(Uexküll 2010, 42). In order to do this, he suggests, we must create an imaginary soap bubble around each creature. Each of these bubbles contains only the perceptions to which the creature has access and then forms its own true world. Each of these bubbles represents the world as it appears to the organisms themselves. As each organism perceives differently, there are as many of these worlds as there are organisms in nature. Uexküll does not consider organisms as mere objects but as subjects whose essential activity consists in perceiving and acting. Everything an organism perceives is part of its perceptual world [*Merkwelt*], while everything an organism makes is part of its operational world [*Wirkwelt*]. The perceptual and operational world together form a closed unit called *Umwelt* (Uexküll 2010, 42; Ostachuk 2013). In this manner, even if the same objects are present in a certain environment, they will not be perceived in the same way by the different organisms, and they will not have the same meaning for them.

The second important Uexküllian concept to consider in this context – that is to say, when it comes to the relation between an organism and its environment – is that of conformity to a plan [*Planmäßigkeit*]. Uexküll calls conformity to a plan the force of nature "that combines the manifold details into one whole by means of rules. Higher rules, which unite things separated even by time, are in general called plans" (Uexküll 1926, 175). Elsewhere, Uexküll defines conformity to a plan as "a rule stretching across time and space," "a rule in living Nature, which reveals itself even in the mechanical processes of the organism" (Uexküll 1926, 270), and as "a super-mechanical law" (Uexküll 1926, 271). Conformity to a plan is responsible for the creation of all organisms and their *Umwelten*, it is like the score laying out the "melody," which accounts for the whole of nature. Ultimately, conformity to a plan ensures the perfect complementarity between the different organisms and their *Umwelten*.

By means of this notion, Uexküll expresses himself against the concept of adaptation. From the point of view of the adaptation theory, in fact, "each organism is the product of influences to which it has been exposed for thousands of years" (Uexküll 1926, 319). Through innumerable cycles of trial and error, organisms reach their appropriate form, a final product adapted and congruent to the conditions of the environment in which they are present. Uexküll also criticizes the Darwinian theory, which aims to explain adaptation through the mechanism of natural selection. According to Darwinism, the struggle for existence determines organisms to compete with each other, a struggle in which only the "most adapted" will be able to survive. Differently, according to Uexküll, it is impossible for an organism, even a machine, in which all parts fit together properly, to arise through such a mechanism: "It certainly requires a powerful imagination to assume that any machine capable of functioning could arise in this way. But the Darwinians provide the requisite imagination" (Uexküll 1926, 320). In other words, Uexküll argues, it is impossible for a cooperative structure to emerge from a competitive mechanism.

According to Uexküll, then, nature produces all its organisms following a plan. The adjustment between the different parts of an organism, and between the organism and its *Umwelt*, is not produced by external erosion or molding, but they are

adjusted, they are *congruent* with each other, from the beginning. This congruity is guaranteed by the plan, which is what builds the organisms in harmony with their *Umwelten*. The plan for the construction of the *Umwelt* of each organism at any given moment, as well as the tunnel formed by the addition of its successive vital moments, what Uexküll calls *life-tunnel*, is fixed and is not subject to change. However, Uexküll also recognizes that deviations may occur which are responsible for generating the illusion of the variability of organisms. These deviations are of secondary importance, and Darwin's error was to have made them the main feature, when the main characteristic is the plan itself. Needless to say, the notion of conformity to a plan is not without difficulties. One could raise for instance the objection that the reduction of the whole of nature to a supermechanical rule, that includes all the functional circles established between organisms and their *Umwelten*, entails also the reduction of the concept of subject to the mere assembly of functional circles, unlikely to allow much room for the characteristic autonomy and creativity of organisms. This point will be, as we shall see, the target of Kurt Goldstein's criticisms of Uexküll's theory.

In short, to ensure harmony and the perfect adjustment between organisms and their environments, Uexküll advocates the existence of a predetermined world, a world in which life-tunnels are fixed and predestined: "Proceeding from these immutable factors that determine all life in the world, we come to see that life itself is based on fixed laws, which are in conformity to a plan" (Uexküll 1926, 84).

3 Goldstein: the debate between the organism and its environment

In the section "Criticism of the Purely Environmental Theory" of his work *The Organism*, Goldstein criticizes, in the last instance, the theory of Uexküll. Goldstein argues that an organism not only lives in its own environment, to which it is perfectly adjusted, but must also deal with all other stimuli of the environment, including potentially negative ones. The organism does not live isolated or segregated in its own environment as if the rest of the world did not exist and all the stimuli it receives were adequate for it. For Goldstein, the environment of an organism is neither definitive nor static, but it is formed with the development and activities of the organism. In this manner, he affirms: "One could say that the environment emerges from the world through the being or actualization of the organism" (Goldstein 1995, 85). In other words, the organism, in order to exist, must find an adequate environment for itself; it must create it taking advantage of the opportunities offered by the world. "An environment always presupposes a given organism" (Goldstein 1995, 85) and not the other way around. An organism does not acquire order at the expense of its environment; an organism rather acquires order at the same time that the environment obtains it. However, Goldstein subsequently seems to change his mind, as he states that the "environment first arises from the world only when there is an ordered organism" (Goldstein 1995, 85), thus suggesting that first there must be an ordered organism for an environment to be created. According to this second version, order comes

ultimately from the organism itself. In this regard, Goldstein brings the case of a diseased organism. For this organism, the environment prior to its state of disease has become strange and disturbing so that the essential requirement to exist and to return to a state of new normality is to make for itself once more an adequate environment. If we consider in-depth the previous case, we see in reality that the order is restored with the creation of a new adequate environment and not by reverting to a previous or anterior order of the organism on its own. Consequently, the restoration of order obviously requires the activity of the organism, but it is achieved and reached when it finds the appropriate conditions for the generation of a new adequate environment.

For Goldstein, the fundamental relationship between an organism and its environment is a debate or coming to terms (Goldstein 1995, 42; Ostachuk 2015). There is a fundamental separation between the organism and its environment, which makes them strange and which requires a constant debate and coming to terms between the two so that the relationship can be maintained. The organism achieves this coming to terms through a behavioral act called performance [*Leistung*]. When a performance is effective, the organism develops an ordered behavior. This is characteristic of a normal or healthy state. On the contrary, when a performance is ineffective, the organism develops a disordered behavior, which manifests itself in the form of a "catastrophic" reaction. This is the characteristic state of a pathological or disease state. In this case, the organism will proceed to recover the normal situation. This amounts to saying that there is a tendency in the organism to live in ordered behavior. Therefore, for Goldstein, disease consists of a disarrangement or disequilibrium that breaks the productive relationship between the organism and its environment. On the other hand, "an organism that actualizes its essential peculiarities, or – what really means the same thing – meets its adequate milieu [*Umwelt*] and the tasks arising from it, is 'normal'" (Goldstein 1995, 325). Goldstein arrives, in this manner, at a definition of normality. Normality, or the normal state, is the state in which the organism develops norms that allow it to respond adequately to its environment. Moreover, recovering health, that is, rehabilitation, consists of reaching a new order, a new normality, a new individual norm, which implies making for itself a new environment in which it can respond appropriately again.

The organism, in its relation to the environment, not only seeks its preservation [*Erhaltung*] but also its prosperity. For Goldstein, survival is the typical lifestyle of the disease state. A healthy organism not only seeks self-preservation but also aspires to self-realization [*Selbstverwirklichung*]. Self-realization is the tendency of organisms to realize their own essence and their peculiar individuality. This can be interpreted as a critique of Darwin's theory, which postulates natural selection as an evolutionary mechanism, based on the "struggle for existence," the competition among individuals, and the "survival of the fittest." For Goldstein, this would be a model of the world and society in pathological and disease state.

4 Canguilhem: normativity and institution of norms and values

The element of novelty introduced by Canguilhem in the relationship between the organism and its environment is that the former is characterized by the faculty of

creating and instituting norms; that is to say, it possesses normativity or normative activity (Ostachuk 2015). In this respect, the organism not only has norms and is able to fulfill them, that is, it possesses normality, but its most characteristic and genuine feature also is that of creating and instituting new norms, that is, it possesses normativity. This is already stated by Canguilhem in his first book, *The Normal and the Pathological*:

> life is polarity and thereby even an unconscious position of value; in short, life is in fact a normative activity[. . . .] Normative, in the fullest sense of the word, is that which establishes norms. And it is in this sense that we plan to talk about biological normativity.
>
> (Canguilhem 1991, 126f.)

A healthy organism then does not limit itself to self-preservation, resisting any variation and adaptation to new situations, but embodies norms that drive it forward:

> Health is more than normality; in simple terms, it is normativity. Behind all apparent normality, one must look to see if it is capable of tolerating infractions of the norm, of overcoming contradictions, of dealing with conflicts. Any normality open to possible future correction is authentic normativity, or health. Any normality limited to maintaining itself, hostile to any variation in the themes that express it, and incapable of adapting to new situations is a normality devoid of normative intention.
>
> (Canguilhem 1994, 351)

A healthy organism does not seek so much to preserve itself, to maintain its state and its environment, but, rather, to realize its own nature, which implies seeking new challenges, overcoming new obstacles and, ultimately, exposing itself to new risks. Consequently, a healthy organism is constantly exposed to the risk of losing its order and entering into situations of catastrophic reaction, that is, of becoming ill. A measure of the health of an organism is its capacity to overcome these crises and establish a new order, restoring an adequate relationship with its new environment. On the other hand, the pathological state does not imply the total absence of norms. Disease is itself a norm of life. However, it is a norm that does not tolerate deviations in the conditions of the relationship with its environment and is incapable of transforming itself into another norm. In other words, "the sick living being is normalized in well-defined conditions of existence and has lost his normative capacity, the capacity to establish other norms in other conditions" (Canguilhem 1991, 183).

5 Teleology and polarity in the organism

Canguilhem makes it clear that organisms have a polarity that consists in actualizing their own norms and values; that is to say, organisms are normative. This echoes Goldstein's suggestion that the natural tendency of organisms is to actualize their own essence, that is, the tendency toward self-realization.

Despite these claims, Goldstein explicitly opposes the teleological approach to organisms. His explanation is however not free of ambiguities and inconsistencies. In the first place, Goldstein rejects the teleological approach but recognizes that an "inner purposiveness in the sense of Kant" (Goldstein 1995, 323) could be accepted. He then introduces Karl Ernst von Baer's distinction between purpose [*Zweck*] and goal [*Ziel*]: "According to him 'purpose' is an intended task, whereas 'end' is a given direction of activity, an intrinsically predetermined effect" (Goldstein 1995, 324). Following von Baer, Goldstein maintains that the concept of purpose is inadequate and should be abandoned, while the concept of goal, which he interprets as the actualization of an essence, is useful and adequate for the understanding of the organism. With this explanation, Goldstein seems to support rather than reject teleology in organisms. The definitions of *goal* as "an intrinsically predetermined effect" and "actualization of an essence" are even compatible with the Aristotelian conception of teleology (Ostachuk 2016).

Uexküll had already pointed to the importance of von Baer's distinction between purpose and goal, although he explains it in more detail, quoting an example from von Baer himself:

> When a bullet leaves the barrel of a gun and hits the target, the target is the factor that prescribes the path for the ball. If we imagine the act of shooting to be eliminated, we must ascribe to the ball itself the property of being influenced directly by the target in the direction its movement takes. In such a case the ball possesses what Baer calls "effort toward a goal."
>
> (Uexküll 1926, 316)

According to von Baer, an embryo possesses this "effort toward a goal." Uexküll does not agree with this argument. In the first place, Uexküll considers that the goal is not the adult organism but the congruity with its *Umwelt*. In the second place, he believes that this goal cannot be achieved through this "effort toward a goal." For Uexküll, there are no influences from the *Umwelt* that can affect or alter the course of development of an embryo, since it does not possess the necessary organs to know the properties of the external world. And yet, says Uexküll, we see that the embryo "unerringly produces definite counter-properties, which fit into a definite group of properties in the external world" (Uexküll 1926, 317). This happens thanks to the perfect congruity between the organism and its *Umwelt* ensured by the conformity to a plan.

In fact, von Baer's example itself seems inappropriate. Eliminating the act of shooting in order to ascribe to the bullet the property of being attracted by the target makes for an unjustified assumption that leads to a wrong conclusion. In this particular case, the one responsible for determining the direction of the bullet is the shooter, not the target. Without a shooter, the bullet would not be fired, and if it were fired accidentally, its direction would be completely random. In general terms, without an agent there is no action, the action being a movement with a specific purpose. And it is the agent who contributes to the end of a certain action. Furthermore, von Baer's distinction between purpose and goal seems to

be compatible with Driesch's distinction between dynamic and static teleology (Ostachuk 2016). Every machine has an end. However, this end is given externally by the designer or constructor of the machine. This is the external, static teleology, in which what is sought is the fulfillment of a goal or an end [*Ziel*]. An organism, on the other hand, is not only capable of fulfilling a given end but also of creating and choosing new ends, that is to say, it possesses a purposive capacity that allows it to adopt autonomic actions. An organism possesses internal, dynamic teleology, in which what is sought is the fulfillment or achievement of a purpose [*Zweck*]. In other words, it possesses purposiveness.

6 The organism and the machine

There is only one case in which von Baer's concept of "effort toward a goal" would be compatible with Uexküll's theory. It is the case in which the goal is the plan itself. If we accept this, we must accept at the same time that the world and nature are machines and that they work only according to mechanical laws. This is what Uexküll seems to indicate when he talks about the plan as "a supermechanical law." However, this mechanical view does not seem compatible with his view of a world populated by subjects. Despite believing that there is a distinct difference and a discontinuity between living beings and physico-chemical processes, Uexküll states that this difference is that the latter are mere mechanical processes, while the former have "supermechanical powers." These supermechanical powers of organisms consist of: the construction of the machine, the running of the machine, and the repair of the machine (Uexküll 1926, 121). These powers come, ultimately, from the rules of conformity to a plan.

Canguilhem hardly agrees with these reasonings of Uexküll. He, rather, strongly supports the irreducibility of the organism to the machine: "it is an illusion to think that purpose can be expelled from the organism by comparing it to a composite of automatisms, no matter how complex" (Canguilhem 2008, 91). Inspired by Bichat, he remarks that there is no mechanical pathology; that is, a machine does not get ill. There is no distinction between health and disease in a machine. A machine cannot be healthy or diseased because it does not establish a relationship with an environment, and as we have already seen, for Goldstein and Canguilhem, health consists of an adequate and productive relationship with one's own environment. Based on Hans Driesch's experiments, Canguilhem states that embryological development cannot be reduced to a mechanical model. Whereas Uexküll argues in favor of the perfect congruity between all organisms and their *Umwelten*, Canguilhem advocates the autonomy of the living. One could even wonder if the relationship itself between the organism and the environment is not annulled by the very idea of a perfect but fixed and invariant adjustment. Once the relational element is eliminated, the "possibility" of change and variation over time is also erased. However, the autonomy of the living seems to require this possibility of "relation" with its own environment. And unless one wishes to promote the existence of a world populated only by machines, ordered and adjusted to each other mechanically, one should not do without the idea of autonomy. In

short, as soon as teleology disappears from nature, the organism falls back into the status of a machine.

For Canguilhem, the organism presents the properties of self-construction, self-conservation, self-regulation, and self-repair, while for a machine, "its construction is foreign" and "conservation demands the constant surveillance and vigilance of the machinist" (Canguilhem 2008, 88). And the plan is not a machinist, but the blueprint that the machinist uses to build and repair the machine.

7 The archaic relationship between the organism and its environment

In later years, in his work *The Theory of Meaning* [*Bedeutungslehre*], Uexküll develops his theory more explicitly and extensively in musical terms. The development of organisms and their *Umwelten* is part of a great symphony in which all organisms play melodies that are assembled with each other by point and counterpoint: "Every animal, like every instrument, harbors a certain number of tones that enter into contrapuntal relationships with the tones of other animals" (Uexküll 1982, 63). He no longer explains the congruity and perfect adjustment between organisms and their *Umwelten* as a fitting between "pegs and sockets" (Uexküll 1926, 317) but, rather, in terms of the existence of an interrelation and interpenetration between them. In this regard, Uexküll tells us that just as the flower is beelike, the bee is flowerlike so that the melodies played by both resonate in unison.

A much more elaborate example, within this perspective, is that of the spider's web. The spider builds its web according to the structural characteristics of the fly so that the latter cannot see it and gets caught when flying toward it. However, the spider does this without even having come into contact with a fly. So, how does this correspondence occur? Uexküll's explanation is the following:

> It weaves its web before it is ever confronted with an actual fly. The web, therefore, cannot represent the physical image of a fly, but rather it is a representation of the archetype of a fly, which does not exist in the physical world. (Uexküll 1982, 42)

This first explanation then holds that each organism develops thanks to the existence of an original program or archetype and that, in some way, the archetype of the fly influences the archetype of the spider (Uexküll 1982, 43). Few pages later, Uexküll provides a more detailed and accurate explanation of this biological phenomenon:

> The spider's web is certainly formed in a 'fly-like' manner, because the spider itself is 'fly-like.' To be 'fly-like' means that the body structure of the spider has taken on certain of the fly's characteristics – not from a specific fly, but rather from the fly's archetype. To express it more accurately, the

> spider's 'fly-likeness' comes about when its body structure has adopted certain themes from the fly's melody.
>
> (Uexküll 1982, 66)

One way of interpreting this is to think that what we see as individualized and interacting elements in the real physical world exist archaically all included in a great invisible world, in which an overlap of resonant melodies occurs, and in which a clear and sharp separation between them cannot be established. Accordingly, a "relation" is the expression of an original resonant overlap. The evident complementarity and reciprocity between organisms and their *Umwelten* are the expression of a great symphony made up by a multitude of melodies resonating in unison.

There is no such melodic language, or the proposal of a universal interconnectivity in nature, in the works of Goldstein and Canguilhem. For them, the autonomy of the organism and the living prevails. However, it could be ventured that norms and values play this melodic role in the relations between organisms and their environments and that with each norm and value that is actualized, the resonance in unison Uexküll talks about is produced.

8 Meaning and sense

In his work, *The Theory of Meaning*, Uexküll also argues that meaning is the fundamental and key property for the understanding of life. All the objects of the *Umwelt* of an organism are subject-related meaning carriers. Meaning is the connector that unites the organism with each object of its *Umwelt:* "In every instance a very intimate meaning rule joins the animal and its medium" (Uexküll 1982, 54). In even more explicit terms, he also says that "[m]eaning in nature's score serves as a connecting link, or rather as a bridge" (Uexküll 1982, 64). On the other hand, the same object can have different meanings for different organisms. For example, a flower stem acts as a different meaning-carrier for different meaning utilizers: while for an ant, it is a path, for a cicada larva, it is a supplier of material for the building of a house, and for a cow, it is food.

This worldview transforms nature into a huge network of interconnections established through meaning. This ecological view of nature, which can act as an antidote to the mercantilist and competitive views of today, leaves out, however, the consideration of sense. Uexküll provides a very interesting example with regard to this question. The pea-beetle larva, thanks to its tunnel-boring activity, builds a tunnel that allows the adult beetle to leave the pea. If it were not for this tunnel exit, the adult larva would die. This example allows Uexküll to cast doubt on von Baer's claims regarding the presence of a goal-directedness in the origin of living creatures. Unlike the example of the spider web, in which other organisms intervene, which allows Uexküll to assign the anticipation of the spider to the participation in the fly's melody, in this example, this does not happen. It is the same organism that anticipates a future event of its own development: the larva knows

in some way that it has to build a tunnel so that the adult organism can then leave the pea. There is an intentionality on the part of the organism that is not contained in the concept of meaning. Meaning can only act as an extrinsic connector of phenomena. But here we are in the presence of a prediction of a future event, which speaks of the existence of a subjective interiority. This interiority of the living is what anticipates, it has intentions, in short, it actualizes its potentialities.

Canguilhem adopts this second version of the matter. For him, the consideration of sense in biology can never be omitted:

> A center does not resolve into its environment. A living being is not reducible to a crossroads of influences. From this stems the insufficiency of any biology that, in complete submission to the spirit of the physico-chemical sciences, would seek to eliminate all consideration of sense from its domain. From the biological and psychological point of view, a sense is an appreciation of values in relation to a need.
>
> (Canguilhem 2008, 120)

A living being is then an irreducible center of reference, which has needs and institutes norms and values to satisfy them. Consequently, whereas Uexküll emphasizes nature as a network of interconnections mediated by meaning, Canguilhem insists on the centrality and irreducibility of an organism that establishes relations of sense with its environment.

9 Life

Our three authors make for an interesting panel for a discussion of the concept of life. Even between Goldstein and Canguilhem, who otherwise tend toward concordance rather than dissonance, this topic brings out the greatest differences and nuances.

Perhaps the most difficult position to decipher on this subject, Uexküll's position, on one hand, establishes a clear difference between biology and physics and chemistry and argues strenuously for the irreducibility of the living to mere physico-chemical processes. On the other hand, with his concept of conformity to a plan, he seems to make organisms and their *Umwelten*, and ultimately life-tunnels, depend on supermechanical rules and laws, supporting unchangeable congruity and perfect adjustment between each other. This leaves, as we have already seen, the autonomy of the organism in a rather inconvenient situation.

According to Uexküll's distinction between a machine and a living being, a machine is constructed based on a building plan [*Bauplan*] in which the spatial arrangement and function of its different parts are made explicit. And that is enough, since "machines originate namely by assembling ready-made parts into a whole" (Uexküll 1913, 155; my transl.). Living beings, instead, do not originate by the assembly of ready-made parts. Uexküll explains that the problem of the origin of living beings has divided researchers into two groups. On one corner, there are those who at the origin of machines recognize two factors,

human representation, that is, building plan, and mechanical forces, while at the origin of living beings only recognize mechanical forces. On the opposite corner, there are those who maintain that mechanical, physico-chemical forces cannot originate any building plan. An essential factor must exist "that stands above the mechanical forces, to which it directs, so that from diverse parts originates a whole that works in conformity to a plan" (Uexküll 1913, 156; my transl.). This supermechanical factor is for Uexküll what we call life. Life is then conformity to a plan, that is, a supermechanical law or rule. This leaves life in a diminished, regulated and de-autonomized condition, since it associates it with a fixed and preestablished plan.

Goldstein is notoriously the supporter of an organicist theory of life, according to which the fundamental characteristic of the organism and therefore of life is the maintenance over time of its organization, understood as a relation existing between its parts. Goldstein also states that the organism seeks to actualize its own essence and aspires to self-realization; that is, it aspires not only to maintain itself but also to thrive. However, it is Canguilhem who makes greater efforts to defend the autonomy and originality of life. In the first place, he does so by advocating the autonomy and specificity of biology with respect to the physico-chemical sciences. This position leads in general, says Canguilhem, to the qualification and accusation of vitalism. It should be made clear, here, that Canguilhem understands vitalism as a form of confidence in the organism's own reaction and self-defense, that is to say, in its own curative properties against the causal agent of diseases and beyond the constrictor power of remedies. Vitalism thus expresses a distrust in the power of technique over life and approaches naturism in its own terms. Vitalism is ultimately "a permanent exigency of life in the living, the self-identity of life immanent to the living" (Canguilhem 2008, 62). In this context, whereas vitalism comes about as an exigency, mechanism imposes itself as a method but as a method that creates nothing if not by human skill and art. This is why the mechanistic interpretation of the living automatically nullifies the living. Life has a spontaneity and a creativity that mechanism, in its eagerness to reduce it and decompose it into a simple set of machines, cannot account for or explain. For Canguilhem, the constant rebirth of vitalism expresses the unwavering resistance and rebellion of life to be subjected to mechanization. This resistance and rebellion of life to mechanization is also a resistance to its dissolution in an impersonal geographical environment and an exigency to place itself as a center. It is only from this center that it is possible to generate one's own surrounding world, an *Umwelt*.

Conclusion

A tension and counterpoint resembling the one between the organism and its environment are at play between the theories of Uexküll, Goldstein, and Canguilhem. While for Uexküll there is congruity and perfect adjustment between the organism and its *Umwelt*, for Goldstein and Canguilhem, there is debate and coming to terms; there is an actualization of the relation that is produced by the institution of

new norms and values, in other words, biological normativity. Potential estrangement and maladjustment between the organism and its environment are, for Goldstein and Canguilhem, the origin of disease. It would be therefore inappropriate to consider this debate and coming to terms as an adaptation. In each search of normality, the organism does not seek to adapt to an environment that has become strange and hostile but seeks to create for itself a new environment according to its current conditions by establishing new norms. In this coming to terms, the objective is not to survive, that is, to live in a constant situation of "struggle for existence." Such a situation defines instead the pathological state. The ultimate goal of the organism is instead to thrive and aspire to self-realization. Also in disagreement with the concepts of adaptation and struggle for existence, Uexküll sees instead a world in which harmony and perfect correspondence reigns between all organisms and their *Umwelten*.

The question of teleology and sense in organisms is another point in which the tension and counterpoint between the theories of Uexküll, Goldstein, and Canguilhem become clear. Heir to the Kantian issue of teleology as a regulative principle, Goldstein's organicist approach denies the existence of purposiveness in organisms, although he admits it with reservations, provided it is considered in almost metaphorical terms. Like Goldstein, Uexküll resorts to von Baer's theory in order to deny the existence of teleology in organisms. However, the case of the pea-beetle larva makes him doubt and even admit the possibility of the existence of a goal-directedness in the development of organisms. Canguilhem, due to his inclination toward the vitalist theory, has a more original position on this subject and deems sense essential for the understanding of the living.

Regarding the topic of life, the three authors defend the autonomy and specificity of biology with respect to the physico-chemical sciences, and the irreducibility of the living being to a set of mere mechanisms. However, they differ quite a bit as to their respective notions of life. For Uexküll, life is the expression of conformity to a plan, that is, a supermechanical law or rule. This associates life with a fixed and preestablished plan. For Goldstein, life is the maintenance of the organization of a totality, but also the actualization of an essence whose goal is self-realization. Finally, the most affirmative and positive position regarding life is that of Canguilhem. For Canguilhem, life is an exigency that resists and rebels against mechanization and that seeks to position itself as the generating center of its own environment, an *Umwelt*.

In conclusion, the three authors might converge on the idea that the relationship between the organism and its environment is an archaic relation, unfolding in an invisible and musical world, in which the melodies of all the organisms interpenetrate each other and create a symphony that embraces all. This interpenetration accounts for the correspondence between organisms and their *Umwelten* in the real world, as well as for the existence of meaningful relationships between them. This original and common source may well be called a principle, or plan, in reference to the Uexküllian plan, but it must also possess all the creative characteristics of what we call life.

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