

ARTHUR DONY

LEIBNIZ AND THE POLYP, OR THE METAPHYSICAL PUZZLE OF LIFE*

1. Introduction: *Why the empirical approach of the natural sciences cannot fully account for the peculiarity of life*
2. Leibniz and the Living as Real Unity
3. The Polyp and the problem of unity and individuality

ABSTRACT: **LEIBNIZ AND THE POLYP, OR THE METAPHYSICAL PUZZLE OF LIFE**

In this paper, I propose to explore the link between experience and reason in the problem of the apprehension of life. My general claim is that philosophical issues are necessarily involved in a theory of living organisms, since identifying a certain entity as a living being is to go beyond its manifestations. In part I, I argue that the empirical approach of the natural sciences cannot fully account for the peculiarity of life, showing that the different criteria used to distinguish the living from the non-living, as those proposed in biology, may turn out to be inadequate. In the second part, I elaborate on these issues by focusing on the Leibnizian theory of living beings. In particular, I will emphasize how Leibniz's theory exemplifies the problematic relationship between the observable properties of organized matter and the inner (or metaphysical) properties of the living as such. Finally, I will propose to consider the discovery of the polyp in the eighteenth century as a case of particular interest and a challenge to the classical conceptions of the living, insofar as it raises the crucial questions of unity and individuality, which are of utmost importance with regard to the ontological status of life.



1. Introduction: *Why the empirical approach of the natural sciences cannot fully account for the peculiarity of life*

When we ask ourselves about the specific nature of the living organism, it seems natural to turn to biology. Is it not precisely the scope of this discipline to study the natural phenomenon of life, and to investigate its essential properties, common to all living beings? This is what one would expect anyway. However, this

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claim - that biology studies the living *as such* - remains controversial. The reason for this is rather simple. For biology, before even starting to investigate its object, presupposes that we have already determined, among the entities of nature, which ones are living and which ones are not. This identification is prior to biological science and is actually its very precondition. There is, in this respect, a pre-understanding of what a living being is, from which it is possible for us to assign the predicate «living» to animals or plants, as opposed to minerals for example. For this reason, the purpose of life sciences - when they are not accompanied by a thorough reflection on their own foundations - cannot be to explain what life is, but only to describe the function and structure of organisms recognised beforehand as living¹.

However, as is known, biology has attempted to provide throughout its history different criteria to distinguish the living from the non-living. And it is possible to think that the latter, even though established in hindsight, could nevertheless encapsulate the essential features of life. These criteria are many: growth, feeding, breathing, and reproduction are among the most commonly attributed to life. There is also the separation between the internal and the external milieu (C. Bernard), the homeostasis or regulation (W. B. Cannon), the autonomy from the environment (P. Vendryès), etc. Although of great interest, these attempts to establish an empirical dividing line between the living and the non-living, as I will argue, may turn out to be inadequate.

This inadequacy is due, firstly, to reasons of fact. Indeed, with regard to the technological progress, the features commonly regarded as specific to living beings are constantly challenged by inventions of machines or artificial «organisms» displaying

¹ Besides, as Canguilhem has already noted, it is clear that insofar as biology explains life processes in terms of chemical or physical processes, it cannot account for the peculiarity of life. Cfr. G. Canguilhem, *La connaissance de La vie*, Vrin, Paris 1975, p. 32.

similar features. On the other hand, such criteria are likely to be undermined by discoveries of new kinds of living beings, whose unexpected features overcome the boundaries of our categories – as is especially the case with the outstanding properties of the polyp, about which more will be said shortly. In his book *On the mode of existence of technical objects*², Gilbert Simondon has also emphasized the narrow dividing line between machines and living organisms, by providing many examples of machines in many ways similar to the living, and, conversely, of living beings whose properties are very close to those of machines. This fact is well illustrated by the process of «artificialization», according to which an organism, by means of varying manipulations, is deprived of some distinctive properties of the living; as those modified plants which are unable to reproduce, and unable to self-regulate. Does this mean – according to the criteria of Cannon or Vendryès – that these plants are no longer living beings? It is highly doubtful.

To this objection, one may answer that the progress of biology will allow us to uncover a more accurate understanding of life, which will eventually provide a definitive dividing line between the living and the non-living. In order to show why such a claim may be unfounded, I will now turn to the objection of principle against the adequacy of the biological approach to life. This objection is based on the idea that life is, at least in principle, irreducible to the realm of exteriority, and cannot therefore properly be grasped from a purely empirical point of view. As a matter of fact, if we limit ourselves to what is actually observable, namely to some figures and motions of matter, we cannot *know* whether the object we observe is truly a living being. All the empirical properties of an organism such as the growth, feeding, breathing... are at best *necessary* conditions, but

² G. Simondon, *On the mode of existence of technical objects* (1958), English translation University of Western Ontario, London 1980.

by no means sufficient conditions of the living. Indeed, these properties could also be produced by purely mechanical processes, as by lifeless automatons. This is what Leibniz, after Descartes³, had already noticed: «Life, he said, must always be accompanied by perception in the soul; otherwise it will be only an appearance, like the life which the savages of America attributed to watches and clocks»⁴.

This is precisely the internal perception which constitutes, I claim, the essential feature of life. In other words, the phenomenological aspect of the living turns out to be actually crucial. But it is clear, on the other hand, that this aspect cannot be accessed in a third person point-of-view: we cannot observe the very perception of a given organism, but only its various corporal expressions. To identify a certain entity as a living being is, therefore, to go beyond its manifestations⁵.

2. Leibniz and the Living as Real Unity

As it is well known, the distinctive feature of living consists, according to Leibniz, in the possession of a principle of unity.

³ «I should conclude, writes Descartes in his *Third Meditation*, that I knew the wax by means of vision and not simply by the intuition of the mind; unless by chance I remember that, when looking from a window and saying I see men who pass in the street, I really do not see them, but infer that what I see is men, just as I say that I see wax. And yet what do I see from the window but hats and coats which may cover automatic machines? Yet I judge these to be men» (R. Descartes, *The Philosophical Works of Descartes*, vol. I, English translation Cambridge University Press, Cambridge 1969, p. 155).

⁴ G. W. Leibniz, *New Essays*, III, X, §22 (A, VI, 6, pp. 348-349). I use the following abbreviations for Leibniz's works: A = Deutsche Akademie der Wissenschaften (ed.), *Gottfried Wilhelm Leibniz: Sämtliche Schriften und Briefe*, Akademie Verlag, Berlin 1923; GP = C. I. Gerhardt (ed.), *Die Philosophischen Schriften*, Berlin 1870-90, 7 vols. All translations are mine, unless otherwise indicated.

⁵ As far as I can see, there are only two possible lines of retreat. The first would consist in reducing life to its external appearances. However, as I have argued, this would imply to undermine the very distinction between the living and the non-living, since there would not be any difference between a living being and an artificial machine reproducing exactly the same appearances. Another line of retreat would be based on the idea that there exists a necessary link between life and its manifestations. But it is clear that prior to establish such a link, it is necessary to assume the distinction itself, and thus to regard life as being a feature that is irreducible to its external manifestations.

This unity, also called soul or substantial form, has to be conceived by analogy with the unity of our soul, whose essential nature is to perceive. «The activity proper of the soul, he explains, is perception, and the unity of the perceiver depends on the interconnections of perceptions»⁶. Indeed, the perception of our mind cannot be reduced to a mere addition or aggregation of concrete parts, but expresses the multiplicity in a unity, in an integrated whole⁷.

However, the perception, as well as the appetite – which is simply the passage from one perception to another – cannot be explained by means of material features.

Moreover, it must be confessed that *perception* and that which depends on it are *inexplicable in mechanical terms*, that is, in terms of figures and motions. And supposing there were a machine, so constructed as to think, feel, and have perception, one could imagine it increased in size, while keeping the same proportions, so that one could go into it as into a mill. In that case, we should, on examining its interior, find only parts that work upon one another, and never anything by which to explain a perception. Thus, perception must be sought in a simple substance, and not in a composite or machine. Further, nothing but this (namely, perceptions and their changes) can be found in a simple substance. It is in this alone also that all the *internal actions* of simple substances can consist⁸.

This demonstrates that the empirical analysis of the body cannot account for the perceiving soul, since from matter, which is merely passive, one can only deduce the variety of magnitude, figure, and motion. Yet, it is precisely perception and appetite that essentially define the living. For life is inconceivable without perception, and conversely, perception is inconceivable without an animated body⁹. As a result, the corporal

⁶ Letter to Des Bosses, April 1709, GP, II, p. 372.

⁷ GP, II, p. 311; GP, VII, p. 317.

⁸ *Monadology*, § 17, GP, VI, p. 609 (English translation by D. Rutherford).

⁹ «If the body should be devoid of perception and appetite, I believe that it would no more deserve to be called living than a flame that labours to feed itself» (*Replicatio ad stahlianas observationes*, §8, in *Stahl-Leibniz, Controverse sur La vie, L'organisme et Le mixte*, ed. S. Carvallo, Vrin, Paris 2004, p. 109).

manifestations of organisms cannot serve as empirical evidence of their «perceiving» or «living» feature¹⁰.

Let us now return to the question of unity. According to Leibniz, the reality of all compound things is grounded in the simple units that compose them. These units must be indivisible and partless. Leibniz called them «atoms of substances» or «real unities», since they are «the ultimate elements in the analysis of substantial things»¹¹. Moreover, these immaterial principles have something analogous to perception and appetite¹², and are actually forms or *living* principles. Besides, «matter being divisible without end, no portion can be obtained so small that there are not in it animated bodies »¹³, so that there is a world of creatures in the smallest fragment of matter. As Leibniz says: «Every portion of matter can be thought of as a garden full of plants or a pond full of fish. But every branch of the plant, every part of the animal (every drop of its vital fluids, even) is another such garden or pond»¹⁴. In this manner, each individual, defined by its real unity, is at the same time made up of an infinity of nested individuals - which are themselves, in turn, made up of others. But, one might ask, what is the peculiarity of these unities? What makes them different from mere aggregates, since each organism is made up of a plurality of substances? The answer to this question is crucial for our purpose, insofar as finding a criterion of real unity is equivalent to finding a criterion of the living. This criterion relies on the distinction that Leibniz draws between *ens per se* and *ens per accidens*. Contrary to that of organisms, the unity of non-living beings is nothing but an accidental unity. The latter is based on a connection, a contact, a running together into the same thing, or an agreement observed by a mind gathering

¹⁰ R. Andrault, *La vie selon La raison. Physiologie et métaphysique chez Spinoza et Leibniz*, Honoré Champion, Paris 2014, p. 129 e p. 227.

¹¹ *New System*, §11, GP, IV, p. 482.

¹² *New System*, §3, GP, IV, p. 479.

¹³ *Letter to Arnauld*, 9 October 1687, in G.W. Leibniz, *Discours de métaphysique et correspondance avec Arnauld*, ed. by G. Le Roy, Vrin, Paris 1993, p. 186.

¹⁴ *Monadology*, §67, GP, VI, p. 618.

it into a unity¹⁵. All these determinations of unity «have an imaginary something and depend upon the fiction of our minds»¹⁶. One can conceive a herd or an army as having more unity than a heap of stones, but this is not sufficient to make it an individual substance. If one may speak of *a* herd or *an* army, instead of one hundred sheep or soldiers, this collection does not constitute one single thing¹⁷. The same is true of all inorganic bodies, such as minerals, which are nothing but a collection of substances, since they do not constitute themselves a real substance¹⁸. In contrast, the unity of living organisms is an effective reality, although several parts can be distinguished in them:

[...] assuming there is a soul or substantial form in animals or other bodily substances, one must argue from it on this point as we all argue from man who is an entity endowed with a genuine unity conferred on him by his soul, notwithstanding the fact that the mass of his body is divided into organs [...] and that the parts are undoubtedly full of an infinite number of other bodily substances endowed with their own substantial form¹⁹.

Thus, in the case of living beings or *ens per se*, the whole organism is a real substance, while its parts are not themselves substances (apart from the other organisms it contains). Moreover, the mere addition of the parts of the organism cannot produce the whole organism itself, since the unity of the whole makes it a real substance, while the parts of the organism are obtained by way of abstraction. By contrast, in the case of non-living beings or *ens per accidens*, it is the parts which are primarily real. In this respect, the whole does not constitute one genuine substance: the parts are sufficient to produce the whole, which is nothing

¹⁵ A, VI, 4B, p. 1506.

¹⁶ *Letter to Arnauld*, 28 Nov./8 Dec. 1686, cit., p. 145.

¹⁷ Cfr. B. Pascal, *De l'esprit géométrique*, GF-Flammarion, Paris 1985, pp. 80-81.

¹⁸ *New Essays*, III, vi, §24 (A, VI, 6, p. 318); «I hold that a marble tile is not a single complete substance, no more than would be the water in a pool with all the fish included, even if all the water with all these fish were frozen [...]» (*Letter to Arnauld*, 28 Nov./8 Dec. 1686, cit., p. 145).

¹⁹ *Letter to Arnauld*, 9 October 1687, cit., p. 187, English translation by P. Lodge.

but a general name given to a collection of several substances. The outcome criterion, therefore, can be summarized as follows:

α) *Ens per se* (living being): **Unity** $\Rightarrow p_1 + p_2 + \dots + p_x$,

β) *Ens per accidens* (non-living being): **Collectivity** $\Leftrightarrow p_1 + p_2 + \dots + p_x$ ²⁰.

Thus, from the constituent parts of a living being – such as its organs, tissues or cells – it is not possible to produce the living being itself. That is to say that the sum of the parts of an organism cannot account for its global unity. Yet, it is precisely on this point that experience turns out to be insufficient, the unity of organism being grounded in the final analysis on that of its soul. Indeed, the corporeality of an organism, *taken in itself*, does not essentially differ from the corporeality of inorganic bodies, since matter is by nature a plurality, a coexistence of parts more or less connected²¹. In the final analysis, the source of this unity has to be found, once more, in the internal dimension of perception itself. Consequently, to make sure that an organism cannot be produced from the mere addition of its parts, it would be necessary to know whether what we have produced is a perceiving being or not – which, as I have shown, cannot be empirically determined. As we can see, Leibniz's attempt to account for the genuine unity of living beings – as opposed to the accidental unity of non-living things – struggles with the problematic relationship between the observable properties of organized matter and the inner (or metaphysical) properties of the living as such. Crucially, the main difficulty concerns the link between «organicity and

²⁰ Bold prints indicate effective realities, by contrast with names or abstractions.

²¹ «Furthermore, by means of the soul or form there is a true unity – an absolutely single thing – which corresponds to what is called “I” in us. This can't occur in artificial machines or in a simple mass of matter, *however organized it may be*. Such masses can only be thought of as like an army, a flock, a pond full of fish, or like a watch composed of springs and wheels» [*New System*, §11, GP, IV, p. 482, English translation by J. Bennett (my emphasis)].

animation, organicity referring to corporal and phenomenal properties, and animation referring to metaphysical properties of indivisibility [...] opposed to that of bodies»²².

In order to establish such a link between animation and organicity, and in view of the lack of empirical evidence, Leibniz is forced to resort to philosophical postulates. The first one is the *principle of analogy*. «For, Leibniz says, given that in beasts everything pertaining to perception and sensation may be considered to be just as in humans, and nature is uniform in its variety—uniform in its principles, varied in its modes: it is probable that perception too is in beasts. And so beasts are presumed to be endowed with perception until it is proved otherwise»²³. Analogies between species, notably based on anatomy and behaviour, could therefore be used to regard animals as endowed with a soul analogous to ours, a soul which makes them *one* single being.

On the other hand, the *principle of continuity*, according to which nature does not make leaps and contains all the possible variety of living forms²⁴, allows us to attribute a soul to all other organized beings, from the most rudimentary forms to the most complex ones, by passing through all the degrees of perception. Indeed, perception is not always accompanied by consciousness, nor pleasure and pain²⁵: «it can even be completely confused»²⁶. This is why one can conceive that there is perception – and so, life – even in plants, but like in a lethargic state or in an endless sleep:

Of what the perception of plants consists, we cannot say; indeed, we do not even have any good conception of that of animals. But it is

²² R. Andrault, *La vie selon La raison...*, cit., pp. 97-98, p. 127, pp. 367-368.

²³ GP, VII, 329; GP, V, p. 455: «I strongly approve of the research for analogies; plants, insects, and Comparative Anatomy will increase these analogies».

²⁴ There is consequently no «*Vacuum formarum*». See *New Essays*, III, VI, § 12 (A, VI, 6, p. 307).

²⁵ *Letter to Arnauld*, 30 April 1687, cit., p. 166.

²⁶ *Replicatio ad stahlianas observationes*, § V, in Stahl-Leibniz, *op. cit.*, p. 107.

enough to say that the plant has a variety in unity and therefore has a perception; and it is enough that it has a tendency toward new perceptions and therefore appetite, in the general sense in which I use these terms²⁷.

This principle of continuity is of great significance in Leibniz's natural philosophy, and it not only serves him to attribute life to the most tiny and basic beings, but also to predict the existence of living beings that we do not yet know. This is what he writes in a famous text, which merits to be quoted at length:

All the orders of natural beings form but a single chain, in which various classes, like so many rings, are so closely linked one to another that it is impossible for the senses or the imagination to determine precisely the point at which one ends and the next begins – all the species which, so to say, lie near to or upon the borderlands being equivocal, and endowed with characters which might equally well be assigned to either of the neighbouring species. Thus there is nothing monstrous in the existence of zoophytes, or plant-animals [...]; on the contrary, it is wholly in keeping with the order of nature that they should exist. And so great is the force of the principle of continuity, to my thinking, that not only should I not be surprised to hear that such beings had been discovered – creatures which in some of their properties, such nutrition or reproduction, might pass equally well for animals or for plants [...]. But, in fact, I am convinced that there must be such creatures, and that natural history will perhaps someday become acquainted with them, when it has further study that infinity of living things whose small size conceals them from ordinary observation and which are hidden in the bowels of the earth and in the depths of the sea²⁸.

3. *The Polyp and the problem of unity and individuality*

An upcoming discovery will soon have fulfilled what he had marvellously predicted. In 1740, indeed, Abraham Trembley, a naturalist of Geneva, discovered in a pond a tiny and gelatinous organism endowed with several tentacles surrounding a mouth²⁹. Just like Leeuwenhoek, who had already described it a few decades ago, Trembley thought it was a plant. As a matter of fact, this

²⁷ GP, III, p. 581; «The great analogy which exists between plants and animals inclines me to believe that there is some perception and appetition even in plants» (*New Essays*, II, ix, §11, A, VI, 6, p. 139). Also see GP, VI, p. 521).

²⁸ *Letter to Varignon*, 2 February 1702, English translation by A. Lovejoy (quoted par C. Bonnet, *Contemplation de la nature*, part. VII, chap. XVI, in *Œuvres d'histoire naturelle et de philosophie*, Neuchâtel 1779-1783, vol. XVIII, p. 177).

²⁹ A. Trembley, *Mémoires pour servir à l'histoire d'un genre de polypes d'eau douce, à bras en forme de cornes*, Jean & Herman Verbeek, Leide 1744.

weird organism tended to move towards light; moreover, the number of its tentacles was different for each individual, like the branches of trees. But on the other hand, with regard to other features, this organism seemed to belong to the animal kingdom. For instance, it had the ability to crawl from one location to the next. Trembley observed also that this living being was sensitive to touch and contracted when disturbed. Lastly, he noted that the tentacles were moving independently of the aquatic environment, and were used to capture prey. In order to determine whether this organism was an animal or not, Trembley decided to cut it into pieces, expecting that it would die. Instead, he was surprised to see that not only did the polyp survive, but also that the other parts were still living, and regenerated themselves into many little polyps.

These observations raised huge questions about the nature of living beings³⁰. The Cartesian conception of « animals machines », already in decline by the seventeenth century, was undermined by these new discoveries. For how, in view of this, is it still possible to conceive the living in terms of functional unity, based on the mutual relationships between parts (similar to that of a clock³¹), if there are organisms which are not destroyed when cut into pieces? In this vein, one could also mention the Trembley's experiment of turning the polyp inside out, like a glove. As a result, the external environment of the polyp become the internal one, and conversely. Trembley observed that inverted polyps continued to move, eat, and reproduce as usual, as if nothing had happened to them. This underlines once more the

³⁰ On the metaphysical debates raised by the discovery of the polyp, see the beautiful book of Virginia P. Dawson, *Nature's Enigma. The Problem of the Polyp in the Letters of Bonnet, Trembley and Réaumur*, American Philosophical Society, Philadelphia 1987 (in particular, chap. VI, pp. 155sq.).

³¹ Descartes speaks of «the arrangement of its organs, these being so related to one another that the removal of anyone of them renders the whole body defective» [*The Passions of the Soul*, I, art. 30, in *The Philosophical Writings of Descartes* (J. Cottingham, R. Stoothff, D. Murdoch eds.), Vol. I, Cambridge University Press, p. 339].

outstanding plasticity of the living, which can hardly be explained by means of a mechanistic approach. This plasticity shows that living organisms cannot be reduced to a specific organisation of parts, as for instance Descartes, Spinoza³² or Locke³³ thought.

However, the challenge was no less difficult for those who regard life as something distinct from matter. For what becomes of the soul or life-principle when the polyp is divided? Is the soul a divisible entity, like the body? But if we endorse the divisibility of life-principle, why is it still necessary to distinguish it from matter? Such is, in a nutshell, the line of thought of La Mettrie, who rejected the reality of soul and dismissed the distinction between machines and living beings, notably by building on the discovery of the polyp³⁴. It is in this context that the naturalist and philosopher Charles Bonnet, reacting to the materialistic conception of life, revived the Leibnizian theory of the living. In his *Considérations sur Les corps organisés*, he argues that the divisibility of the polyp does not involve the divisibility of its life-principle. Indeed, as he explains, «the Polyp is, so to speak, made up of an infinity of little Polyps, which just need favourable circumstances in order to arise»³⁵. This idea is similar to that of Leibniz, according to which each living being, defined by its real unity, is at the same time made up of an infinity of nested organisms. Thus, when the polyp is divided, the latter remains in only one of the parts³⁶.

³² The Lemma IV to VII of the «small physics» of the 2nd part of the *Ethics* do not resist to the outstanding properties of the polyp.

³³ J. Locke, *Essay concerning Human Understanding*, II, XXVII, §4-5.

³⁴ La Mettrie, *L'Homme-Machine*, Denoël, reed. «folio», Paris 1981, p. 191. Cfr. A. Vartanian, *Trembley's Polyp, La Mettrie, and 18th Century French Materialism*, in «Journal of the History of Ideas», XI, 3, 1950, pp. 259-286.

³⁵ C. Bonnet, *Considérations sur Les corps organisés* (1792), Fayard, Paris 1985, part. II, chap. II, art. 278, p. 268.

³⁶ Leibniz uses the example of an divided insect, arguing that «the soul of the insect will remain only on one side, [...] in a certain part that was already living, [a part which is] as small as is necessary for it to be protected from the action of someone tearing or destroying the body of that insect» (*Letter to Arnould*, 30 April 1687, cit., p. 167).

But what about the other(s) part(s)? Even though Leibniz did not strictly assume that animals can reproduce by splitting³⁷, he already possessed an accurate pattern to account for such a phenomenon. As he points out:

I dare not maintain that plants have no souls, nor life, nor any substantial form; since, although one part of a tree planted or grafted can produce a tree of the same kind, it is possible that there is in it a seminal part which already contains a new plant³⁸.

Thus, according to the same pattern, the division of the polyp does not undermine its unity, since it remains in one of its parts, while the others are actually nested individuals growing into a separate organism³⁹. Besides, if the whole polyp is nothing but a collection of individuals, and is not endowed with a genuine unity, the difficulty would disappear: by dividing a polyp, one would only divide a collection, whose unities would not be shattered.

If this solution may appear speculative, it should not however be expected that there can be scientific answers to such issues. It is on this point that I would like to conclude. I have pointed out that a polyp is actually constituted as a colony of self-contained, smaller polyps. Because of that, it is difficult to determine which one is the living organism exactly. Is it the colony as a whole or each of its members? In other words, the problem remains to know whether the polyp is nothing but a collection of budding polyps, or is endowed with a genuine unity which makes it a full-fledged organism. Indeed, even though the movements of the whole organism are coordinated in such a way that seems to exclude that the latter is a mere *collection* of organisms, it is still possible to explain these common motions

³⁷ «Besides, a slip from a plant is very often able to produce a new and complete plant, and no analogy to this has yet been observed among the animals; so the foot off an animal cannot be called an animal, in the way that it seems that each branch of a tree is a plant which is separately capable of bearing fruit» [*New Essays*, III, vi, § 23, A, VI, 6, p. 317, English translation by P. Remnant and J. Bennett (my emphasis)].

³⁸ *Ibid.*, pp. 160-161

³⁹ J. E. H. Smith, *Divines Machines. Leibniz and the Sciences of Life*, Princeton University Press, Princeton 2011, pp. 155-157.

and behaviours by means of shared external influences⁴⁰. Yet, the answer to this question is of utmost importance if we want to determine which one is the living organism: the whole polyp or each of the little polyps it contains? And if the whole constitutes a genuine organism, how shall we explain its unity?

The same question could be raised about plants. Is a tree an organism endowed with a real unity, or is nothing but a mere collection of branches and shoots, which are in fact so independent that they can become, by cutting, a complete and autonomous organism? Some other cases may seem less controversial. For instance, in the same way that we know that a herd of sheep is not a single organism, even though each sheep is a living one, we think we know that a forest is not a living organism. But, here again, this assumption remains conjectural. For example, whole forests of trembling aspen turned out to be made of individual trees that are genetically identical, and are all offspring of a single root system. To say that the forest is living would perhaps no longer be, at least in this case, a mere metaphor.

This emphasises the fact that the questions of *unity* and *individuality* are of significant importance with regard to the ontological status of life - questions which, as I hope to have shown, cannot be answered solely by an empirical investigation, but crucially involve philosophical issues.

ARTHUR DONY Doctorant à l'Université de Liège, Département de Philosophie

arthur.dony@hotmail.com

⁴⁰ Cfr. F. Brentano, *Psychologie du point de vue empirique*, tr. fr. Vrin, Paris 2008, pp. 177, pp. 185-186. Besides, we know it is the case in some species of jellyfish, like *Physalia physalis*. Indeed, as T. Pradeu explains: «Bien qu'elles apparaissent comme des individus, [ces méduses] sont en fait des sinophores, c'est-à-dire des colonies d'organismes qui s'unissent temporairement pour former, apparemment, un être, mais qui sont en réalité chacun spécialisé dans une tâche particulière (la motricité, la défense, etc) et qui ont des cycles de vie indépendants» [T. Pradeu, *Qu'est-ce qu'un individu biologique?*, in P. Ludwig, T. Pradeu (eds.), *L'individu: Perspectives contemporaines*, Vrin, Paris 2007, p. 101].