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Dossier Georges Canguilhem

Canguilhem and his *Workgroup*

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Abstract:

This paper develops a brief analysis of the book *Du développement à l'évolution au XIXe siècle*, by Georges Canguilhem and his research workgroup during the years 1958-1960. What is at stake is the history of two core concepts of biology in the 19th century whose unfolding continues to persist at the beginning of the 21st century. Concerning the *positive* history of modern science, influential works and authors in this history, particularly Spencer and Darwin, are addressed here, in addition to Auguste Comte and Lamarck, when taking into consideration their *legendary* aspect. Each of these concepts has a birthplace of its own. It is also possible to identify a remarkable historical *démarche* but also moments of rapprochement and even of inversion of their meanings; a history of errors, as well as a fundamental history of their histories and of their many *retrospective illusions*.

Keywords:

Canguilhem; History of Biology; Theory of Evolution; Development; Spencer and Darwin

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I purport to present herein my interpretation of a book that was described by Georges Canguilhem as "*un travail d'équipe*" (Canguilhem 2003, 9). This is a study carried out during the 1958-1959 academic year and in the first quarter of 1960. Its content is an account, or a report (to use a term more familiar to our Academy), of the main results, or conclusions reached by the research workgroup. The authors mention in the book's presentation that it was first published in 1962, in the Thalès journal, but, paradoxically, without much repercussion. Fortune was probably reversed with this new publication. Thus, Etienne Balibar e Dominique Lecourt wrote in the book's presentation: "In fact, for the majority it will be a discovery because, considered as an indispensable working tool by the historians of science specialized in the history of biology, (perhaps, because of ignorance or omission) it is not found in the great intellectual public's libraries, unlike other works of their authors" (Balibar & Lecourt 2003, 5).

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A *fortunate discovery*, one could say, and the signatories of this "Presentation" endorse it: When writing the intellectual and institutional history of French philosophy from the years 1950 to 1970, one cannot

> forget that the importance of the research seminars conducted by George Canguilhem at the Institute for the History of Science, at *Four* Street, (from which he had assumed the direction succeeding Gaston Bachelard) will certainly be considered decisive. It is a place of reflection and privileged education for those who have had the opportunity to enjoy a more or less lengthy attendance. It is also a place of controversies, often live, historical and philosophical, worthy of the term political in its broadest and most demanding sense. Above all, it is a place of work, which, in its own right, allows us to name it the "*biais épistémologique*" of contemporary French philosophy. Rather than a fashion trend (structuralist or otherwise), it represents a meeting of knowledge, an incentive to critical rationality. (Balibar and Lecourt 2003, 6-7)

Forty-one years ago, Canguilhem himself had already expressed his evaluation in his brief *Avant-propos*: "a historical study of the formulation of the concepts of development and evolution seemed worthy of being attempted, unlike the futility of erudition or scholarly exercise" (Canguilhem 2003, 9).

The object of the studies is thus defined: the history of the concepts of development and evolution in the 19th century. Although heterogeneous, comprised of researchers from different specialities, this *group* does not realize the ideal of a certain *scientific city*. It has no pretences towards scientificity, in the strict sense of the word science. The presence of the noun "history" in the above quotation must be underlined here: it is not about the history *tout court* of the historians of society, nor a history of scientists who are dependent on a *regional* language. It is about an epistemological history. The group gets together to make philosophy of sciences.

From the outset, it may be appropriate to make the following remark: from the turn of the 19th century, the scientific truths emerge within a *regional rationalism*. Its history demands the abnegation of classical universality. For this reason, teamwork does not authorize unrestrained interdisciplinarity. As Bachelard points out, the scientists gather to exchange information and *to study*. "Only philosophers think before studying" (Bachelard 1978, 7). Paradoxically, historical epistemology demands a *conversion*: to learn with science. Contrary to what is often expected, it is science that effectively "creates philosophy" (Bachelard 1978, 7). In other words, it offers the philosopher that which is to be thought, a specific thinking, and, thus, not just any or every manner of thinking. For the philosopher, there is only this, so well expressed by Canguilhem in a subtle wave to Hegel: "the patience of the concept". At the beginning of the report, the digression acquires a special weight:

> Without doubt the concepts in question played at the time, as they still do, a great role in the thinking of philosophers, historians, sociologists, and psychologists. But we consider that it is first of all from the biologist's viewpoint that it is necessary, in order to carry out a research study, to put forward the instructive meaning of a concept reformation [*réformation*], regardless of the whole amplitude outside the domain of origin. (Canguilhem et al. 2003, 13)

To favour the *biologist's viewpoint* does not necessarily mean engaging in biology. Incidentally, this remark is valid for the investigation of thought events in other fields. This attitude is needed for the sake of method. The orientation of what must be done is always dependent on the object. More than once researchers have reiterated this need to operate through immanence; to reveal a *démarche*, never linear, of concept formation. Furthermore,

to reveal the misapprehensions of this history, constructed from another viewpoint, either by the metaphysicians, avid for transcendence, or by theologians, who are prisoners to a supposed first word, if not to an absolute ignorance of what is at stake. Regarding the concepts of development and evolution, although aware of the extra- or parabiological developments – the members of the workgroup insist on that immanence: they remark that these concepts "belong to the class of terms which contain, in relation to an image evoked by its etymology and under the aspect of a mere description of facts, a thesis concerning the essence of its production. Here, the implicit thesis concerns the essence of generation" (Canguilhem et al. 2003, 13-14). Beginning in the 17th century, but more particularly in the 19th century, this concept, along with others, like reproduction, organism, fertilization, and means, sets the ground for discussions on the living. As stated by F. Jacob, previously,

> from antiquity to the Renaissance, knowledge of the living world has not much changed. When Cardan, Fernel or Aldrovandi speak of beings, they practically repeat what Aristotle, Hippocrates or Galen said. In the 16th century, each body of this world, each plant, each animal was habitually described as a specific combination of matter and form. Matter is always composed of the same four elements. Therefore, only the form characterises a body. (Jacob 1983, 26)

It was necessary to abandon this long tradition, particularly the concept of creation, so that a revolution in the knowledge of the living became possible. Just as in Physics, with Galileo, here as well, in the knowledge of the living, we had a Classical Age. And the chronology is more or less the same. Even though it acknowledges the long past with its continuities but also with its moments of novelty, and grants Lineu (and his contemporaries) an inaugural epistemological statute, Canguilhem's *workgroup* virtually dismisses one century of history and settles very restricted temporal limits to its research:

- 1759, the year of the publication of *Theoria Generationis*, by Caspar Friedrich Wolff;
- 1859, the year of publication of *On the Origin of Species*, by Charles Darwin.

One century separates the publication of the two books. And the creation of the research workgroup at the Institute for the History of Science, at the turn of 1958/1959, is inspired by the conjunction of two anniversaries: 200 years of Wolff's work and the centenary of Darwin's work – which, for those who know the spirit of the research participants, obviously is not the fundamental factor. Dates, authors, works, as well as celebrations, flourish in other spaces (just consult the calendars of the most varied institutions) where, as previously mentioned in the words of Canguilhem himself, the futility of erudition or scholarly exercise is fulfilled. There, as stressed earlier, what really matters is the work of thought. This is quite explicit at the beginning of the text:

> The present study concerns itself with the main phases of concept formulation, by the means of controversies, crises, rectifications, convergences, thanks to which, over the course of the years 1759 to 1859, the very same terms of *development* and *evolution* come to mean for embryologists and zoologists of the second half of the 19th century, almost the opposite of what they meant to 18th century naturalists. (Canguilhem et al. 2003, 13)

It is a difficult task, since it requires coping with the original texts, not always immediately available. Furthermore, they are written in unfamiliar and often archaic languages. Moreover, the concept path would become incomprehensible in the case of the studies being restricted to a confrontation of two phenomena, Wolff and Darwin, or perhaps, of only two works. In fact, a concept does not seem to have a precise paternity, not even a

previously traced destiny. Even though two names arise as if in a polarity, the emergence of many other thinkers can be observed, whether from the sciences or from philosophy. But it does not matter. Beyond the authors, there is thought and concept, above all, in their adventures. I will briefly trace those moments pointed out by the researchers themselves as epistemologically important. They seem to have learned from Bachelard that a concept takes on its most acute sense when its meaning is changed.

I mentioned above the chronological limits established by Wolff's and Darwin's works. I have also accepted the thesis that chronology does not count for much in the studies of historical epistemology. What does matter is the logical time, or perhaps the time thought. Ultimately, the time *judged*, in the sense in which Bachelard speaks of the history judged. It seems legitimate to recognize a first judgment: the strategic place of those two signs, borrowing a concept of Foucault's archaeology. Looking into the epistemological status of each one. In relation to the former, the crowning *privilege* of an age and, to the latter, the inaugural (decisive) gesture of a radical novelty, the *Theory of Evolution* and, to each one, its metaphysics as well. For the first one, the Being is, while for the second, the improbable becoming. The watershed seems to be very clear: on the one hand, the preformationists,[2] on the other, the evolutionists. For the former, from the beginning there has been an identity or a substance – despite developments – whose fundamental structure would not be altered. For the latter, the present forms would not necessarily be prefigured at some original starting point. One could not always recognize a common thread that tied the present and the past, as well as the future.

However, the report shows that beyond this overall framework, the thinking travels along much more winding and much less explicit paths. Throughout the entire 19th century, shadows contended with the lights for the right to truth. In the end, it shows that there is no *pure philosophy*. The report shows that, throughout the period studied, no pure preformationist can be found, not even Wolff, and that the perfect evolutionist is a chimera. And Darwin himself at times seems to flirt with the tradition he had fought tooth and nail. The most interesting facet of this research report seems to be the exploration of these indecisions, of these epistemological oscillations, witnessed by a series of authors and / or works. It is impossible to depict, with any precision and competence, the content of the nine chapters, some of which contain more than one reference. Notwithstanding, it seems to be possible to highlight what, according to the researchers, is decisive in each study for the birth

[2] The report's Appendix "B" brings two brief excerpts. One, of a letter from Bonnet addressed to M. Malesherbes (10/30/1762), the other, by Taine, accusing Royer-Collard of "*fair la police en philosophie*". Both, though with different objectives, translate accurately what *Preformationism* means.
- Bonnet: "My only goal has been to show everywhere that organized bodies are subject to the law of development and that what we call *generation* is only the evolution of a preformed germ [...] So here I have that simple naturalist; I have always brought back my reader to the Being of beings, and I have shown the imprint of his hand in all those admirable productions, the formation of which has been attributed to purely mechanical causes, as if an animal had the same origin that a cheese". ("Mon but unique a été de démontrer partout que les corps organisés sont soumis à la loi du *développement*et et que ce que nous nommons *génération* n'est que l'évolution d'un germe préformé [...] Je n'ai donc ici que simple naturaliste; j'ai toujour ramené mon lecteur à l'Être des êtres, et j'ai montré l'empreinte de sa main dans toutes ces productions admirables dont on avait attribué la formation à des causes purement mécaniques , comme si un animal avait la même origine qu'un fromage".) (Canguilhem et al. 2003, 114).
- Taine: "Brizez, sir, these detestable jars, these immoral fetuses, these eggs, these specimens of embryogeny. Renounce epigenesis. Return to the theory of preexisting germs. Nothing is more dangerous than to show a drop of blood transforming itself, and by itself only, into an animal that lives and thinks". ("Brizez, Monsieur, ces détestables bocaux, ces foetus immoraux, ces oeufs, ces spécimens d'embryogénie. Renoncez à l'épigenèse. Revenez à la théorie des germes préexistants. Rien de plus dangereux que de montrer une goutte de sang se transformant ele-même, et, par ele seule, en un animal qui vit et qui pense".) (Canguilhem et al. 2003, 114).

of a science of evolution and, on the other hand, what could be understood as an epistemological obstacle in this singular history of biology. Perhaps, even this is not feasible. In the end, the choices of our own reading remain; a point of view that is exterior to the researchers' work.

A passage from Chapter IX, entitled "*Les incertitudes de l'épigenèse: Th. Huxley et Ch. Robin*", seems to define the epistemological vectors which alternate in the succession of the characters analyzed in the seminars coordinated by Canguilhem, and that resulted in this book entitled *Du développement à l'évolution au XIXe siècle:*

> What Huxley reproaches for ontogenetic epigenesis, according to Harvey, i.e. its origin in the unorganized, Robin reproaches for phylogenetic epigenesis. Huxley is forced to admit a minimum of potential preformation at the beginning of embryonic epigenesis. Robin places a generation by epigenesis at the beginning of all development in the old sense. While in accordance in their common resistance to admitting that epigenesis has omnigenesis power, the two biologists are quite different in their refusals. Huxley's reservations move in the progressive sense, i.e. the reconciliation of cell theory and Darwinism. Robin's reservations go in the regressive sense, to resurrect Geoffroy Saint-Hilaire, and perhaps Lamarck, to contest Darwin. (Canguilhem et al. 2003, 107)

Here we have two different, even opposed, receptions of evolutionism. With a positivist education, the French Robin wrote in 1873 two articles for *Le Dictionnaire de medicine*, organized by himself and Émille Lettré: one with the title *Évolution* and the other entitled *Développement*. Paradoxically, in the former, there was "no reference to Spencer's and Darwin's theories, no mention of the semantic mutation in the term that continues to designate for the two positivist authors (Robin and Comte) the preexistence of the organism to the act of generation from which it proceeds". In the latter, "insist solely on a distinction between nutrition and development, conceived as a vital property of anatomic elements" (2003, 104). This conception was maintained in the new 1883 article, bearing the same title, *Développement*, this time for the *Dictionnaire encyclopédique des sciences médicales*. "Development is given as one of the results of the evolutility [*évolutilité*[3]] of organized matter" (Canguilhem et al. 2003, 105). Though, at first glance, Huxley, who is close to the preformationist tradition, seems to be much more open to the emerging Darwinian spirit. He writes, in 1878, at the same time of the Robin articles, the paper *Evolution in Biology*, explaining what has been understood by evolution since Harvey, Haller and Bonnet, where one could not think without making reference to preformation. "Nowadays, Huxley remarks, no one, when using the concepts of evolution and development, gives them the same meaning attributed by Bonnet or Haller. These terms mean, for the current biologist, a historical process, history of phases in the succession from which all living beings acquire the morphological and physiological characters that distinguish them" (Canguilhem et al. 2003, 101). We are very distant from Robin, where there is no acquired novelty but solely, since the beginning, the already given *development*.

The Chapter IV, *Histoire et embryologie: le progrès en tant que développement, selon Auguste Comte*, seems to be exemplary in another sense. Here, I do not see a controversy between Comtian and non-Comtian thinkers, nor Positivists. It is the surprising revelation of another face of the creator of Positivism, and which this school at all levels seems to ignore. He is a character not at all modern because he is contemporary and in tune with the biology of the first half of the 19th century. His references are, fundamentally, Baer, Meckel, Geoffroy Saint-Hilaire and É. R. A. Serres – who are all preformists, although they often use terms very close to evolutionism. This classic Comte of biology can be recognized when we shift to

[3] Cf. this note of the research workgroup: "Certains auraient pu penser que l'*evolutilité* ressemble assez bien à une entité de l'âge métaphysique" (Canguilhem et al. 2003, 105, note 3).

politics and morality. Frequently seen in the theory of the three states is the fulfillment of a doctrine of progress. It is possible to trace an undisputed teleology that starts from a primitive state rooted in belief and imagination, the theological state, passing through the philosophical, to the most perfect, developed, rational, and scientific state. The workgroup disputes this interpretation that had borne fruit, particularly in human sciences. On the contrary, no progress could be traced between the three states. It would, rather, be the realization, or the unfolding of an already preformed human nature. Therefore, there is no novelty in the third Comtian state. Regarding moral progress in the positivist state, note this laudable reference to Renouvier and his school: "Thus, one should acknowledge as a great insight the judgment that *La Critique Philosophique*, by Renouvier and his school, makes twice of the Comtian theory of progress and history, in its relation to morality" (Canguilhem et al. 2003, 53). An insight that consists in the perception that any morality is possible, as well as any progress and even any historicity in a thought carved into the heart of preformationism and, I believe, still tributary of the Classical Age, essentially mechanistic and deterministic.[4] The novelty and the unpredictable had to wait for the second half of the 19th century, with Spencer and Darwin.

The report devotes a chapter to each of them. Undoubtedly, it is only an external aspect. As I have pointed out, the brochure is divided into nine parts, shared by many other authors. Furthermore, there are those, such as Lamarck, who were not even given an exclusive place in this lineup. And yet, as noted by the researchers themselves, it is a major absence in this history. In addition to the formal distinction, Spencer and Darwin (the latter in particular) appear, in the discourse order, in a strategic position. They are on the limit or at the dawn of a new epistemological epoch of biology (perhaps of all modern science). This seems to be the fundamental point that separates the *workgroup*'s studies from other histories.

At the outset, it is indispensable to take into account that Spencer and Darwin do not necessarily complement each other. Quite the opposite, they are more apart than united. And the most visible *distance* concerns their different *occupation*: on one side, there is the *philosopher*[5], on the other, the scientist (the biologist). This difference seems already to appear in the titles of each chapter: 1) *L'épigenèse comme modele d'une théorie générale de l'évolution: Spencer;* 2) *Subordination du concept d'épigenèse au concept d'évolution des espéces: Darwin (1859).* In the mid-19th century, the knowledge of living things used to be acquired still through promoting the individual, i.e., it was a question of explaining what happens between the foetus and the adult. Whether new forms would still allow the initial unformed being to be recognized. The epigenesis increasingly assumed the status of fundamental science. In that regard, Darwin and Spencer seem to be in accordance: it is no longer possible to ignore that beings transform themselves; that, in short, there is formation. Or, if you like, there is *evolution*. With this certainty, howev

[4] "What can the moral law mean in the hypothesis of a necessary movement, that is, of a single possible step in history? In such a given situation, it will be in accordance with or contrary to historical law, that is to say, it will command the necessary or the impossible. Command the necessary, useless thing; to command the impossible, something useless again and, moreover, contradictory. In history become a dynamic or an embryology, this ideal command can only be an illusion". ("Que peut signifier la loi morale dans l'hypothèse d'un mouvement nécessaire, c'est-à-dire d'une seule marche possible de l'histoire? En telle situation donnée, ele sera conforme ou contraire à la loi historique, c'est-à-dire qu'elle commandera le nécessaire ou l'impossible. Commander le nécessaire, chose inutile; comander l'impossible, chose inutile encore et, de plus, contradictoire. Dans l'histoire devenue une dynamique ou une embryologie, ce commandement idéal ne paut être qu'une illusion".) (*La critique philosophique*, 1874, I, 322; II, 164. In: Canguilhem et al. 2003, 53).

[5] The emphasis is meant to alert the reader to the strangeness of the qualification because he is not a philosopher *tout court*, but a scientist (a biologist) who philosophizes.

er, there are many uncertainties. Conceptual problems: there is no consensus as to the meaning of the word. Other terms enter into the competition: progress, development, growing, etc. Spatial problems, of object: what evolves? And the divergences abound.

In a world of scientists, Spencer is virtually a scandal: "Spencer wanted to situate his contribution in the philosophical arena. By stressing the importance of evolution, he purported to set limits on philosophy [*donner à la philosophie son cadre*]. By decreasing the specificity of life, which for him is merely a later event, and without great originality, in this evolution, he established a monism of force" (Canguilhem et al. 2003, 60). Without abusing approximations, it seems that the Spencerian concept of force brings us closer to a certain Nietzsche[6], who, incidentally, spared no criticism of Darwin and Spencer. It is about giving evolution (and epigenesis) a generality that goes beyond the restricted biological phenomena. It is the whole universe that *evolves*. This is corroborated by the following quotation transcribed by the text's authors from the article "Le Progrès" (1898):

> This law of organic progress is the law of all progress. Whether it is about the development of the earth, the development of life on its surface, the development of society, government, industry, commerce, language, literature, science, art, it is always this same evolution that goes from the simple to the complex, through successive differentiations. (Canguilhem et al. 2003, 56)

To explain the universal evolution, on which life itself is dependent, Spencer resorted to the notion of force:

> It is necessary to begin from the force; in this world whose essence evades us and identifies itself with the unknowable. We can only affirm that the reality, as it appears, is force, for under all its forms it manifests itself in *experiences of forces*. The force is invariable in the universe: our thought would not grasp that a quantity of force comes to disappear or can be generated from what is not already a force. The forces can only transform themselves into equivalent forces. Permanence and transformability of force: this is the supreme principle of philosophy. (Canguilhem et al. 2003, 57-58)

Here is the biologist philosopher. It is difficult to show, in a few lines, his importance in the history of the science that is the object of studies carried out by the *workgroup*. One of the aspects highlighted relates to the Spencerian comprehension that, in the development of living beings, moments of novelty may occur, and not only of actualisation. "A new structure is neither encompassed by an older one nor its necessary consequence" (Canguilhem et al. 2003, 61). However, the most fundamental factor seems to refer to the liberation of evolution of the individual's restricted circle, of the embryo, if you like. Although he did not formulate a theory of evolution, he philosophically contributed to its possibility. We could perhaps resort to an image provided by Koyré referring to the role of G. Bruno in the history of classical mechanics: how can a shoddy mathematician contribute to the birth of the new science that was essentially a mathematical event? The answer is clear: his contribution is decisive to the extent in which, with the notion of infinite, it has shattered the foundations of Aristotelian synthesis and, thus, Galileo became possible. Perhaps Spencer himself, with his philosophy, has contributed to the *birth* of Darwin. Here too, there is a sort of negative history.

Even so, let me explain this debt. Chapter VI, devoted to Darwin, allows the understanding, through its initial statement, of the inversion effected by the *Theory* of Evolution: *Subordination of the concept of epigenesis* to the concept of evolution of species. We have seen before, in Spencer, the species subordinated to the epigenesist. Therefore, the

[6] We recognize that the idea of a *cosmological* Nietzsche is more than controversial.

species was only one, and not the most decisive, among many analyzed elements of a more general phenomenon. The Darwinian correction effectively constitutes, maybe for the first time, a species as an object of biology. The last lines of the first paragraph of the chapter in question show clearly the novelty introduced by Spencer, as well as the fundamental reference to the Darwinian debt mentioned above: "... the embryologists' epigenesis, in the early decades of the 19th century, as much as it corroborates the analogies that could already be detected, or that reveals unforeseen passages among the forms, does not eliminates this principle according to which evolution is a possibility specially kept for the individual" (Canguilhem et al. 2003, 63). In fact, on the one hand, we have with Spencer a transgression of an epistemological tradition centered on the individual as an object and, at the same time, the constitution of a universal object where all beings could be placed somehow. Without a doubt, the first motion was essential for Darwin: transcending the individual, extricating a new (transcendental?) field of investigation. However, Spencer seems to have gone too far with his *philosophical* pretensions. The intervention of the scientist, of the biologist, was necessary. For him, life taken as an object brings forth its own demands. Nonetheless, it goes without saying: such *demands* mean nothing without a new metaphysics. Without the understanding that there is another open space, now, I would add, space in the order of possibility. After Spencer, it became possible to think something akin to the *species*. Not in the sense of the old *fixism*, but rather as a being or, maybe, a structure that can be formed and, also, deformed. Incidentally, this lesson has already been uncovered by the researchers in Spencer's *Primiers Príncipes,* in Chapter XXIII: "Evolution leads to dissolution" (Canguilhem et al. 2003, 58).

As noted by the researcher, Darwin initiated a radically new perspective in the world of living beings. The considerations of Geoffroy Saint-Hilaire, de Serres, de von Baer in respect of the kinship of forms always refer to anatomical, teratological or embryological facts: they do not leave the domain of morphology. In Darwin, what is most persistent and distinctive are the geographical configurations: geology, species geography, geographical changes, and their possible action on living beings. Does his intellectual vocation not begin in a journey that allows him, in short, to make an investigation of the species in this field very analogous to that which Lamarck had done only in the museum? For Darwin, a living being is, first of all, a being whose total reality exceeds the structure and cannot be entirely reflected there: "a species is also defined by vegetative or relation functions, connected to a certain way of life, implicating a particular environment and expressing itself in the animal, habits and instincts" (Canguilhem et al. 2003, 64-65). In *Les mots et les choses* (Foucault, 1966), Lamarck, along with Jussieu e Viqc d'Azyr, appears in the interesting place of a limiting thought. They attest a situation of epistemological ambiguity shared by the classic and the modern. This *concession* seems not to have been made to the Lamarck portrayed in the report. In Bachelard's style, one could not progress from Lamarck to Darwin without falling into a type of *retrospective illusion*. The well-worn interpretation that the former would be the *forerunner* of evolutionism does not withstand conceptual history. In fact, the outcome is reversed. Epistemologically, there is an obvious gap between them. Furthermore, there is a discontinuity between a tradition (already old) and a novelty in structuring. The reference to Lamark as a museum *tourist* and to Darwin as a traveller in other lands is, undoubtedly, merely the exteriority (and the irony) of this discussion. There is something else at stake: the possibility of another way of thinking. The botanical gardens and museums were undoubtedly the privileged locales for knowledge of the living for at least two centuries. There, the truth emerged from the attentive gaze, from a certain way of seeing, always dependent on a method. The gaze of the naturalist, who could never be blind. One cannot dismiss that throughout the classical age, and even during the 19th and 20th centuries, the

figure of the *herbalist* traveller used to be quite common[7]. Both here and in the visits to museums, what is possible to know is first of all the individual in his visible characteristics. It is always about contributing to the augment and completeness (impossible, as we know today) of the natural environment. Darwin himself is not an *herbalist.* Although a traveller, he is as far from Auguste de Saint-Hilaire (see note 11, below) as from Lamarck. And *vice-versa*; the possibility of convergence is more likely between the latter pair than the former. Even though separated by the Atlantic Ocean, they share the same epistemological ground, swim in the same translucent waters of *Magna Natura*, whether those of the artificial order of the museum's dead pieces or those of the sublime nature of the southern fields. Neither there, nor here, would it be possible to recognize anything that deserves the name of *environment*. The order of the museums occurs by juxtaposition. There is no relation between the pieces, except the geometric one. And the naturalist traveller's collections ultimately also have the same destiny: the universal scale of beings.

The *workgroup* researchers assert that "the reference to the environment equally reveals the inconsistency of every universal scale of perfection or of *consummation* in biology (Canguilhem et al. 2003, 66). The transformism of the first half of the 19th century, particularly according to the Lamarckian formulation, always refers to changes to a prior nature. Despite appearances, certain preformism persists. Furthermore, it must be taken into account that "Lamarck was led to his transformist view of the living world [*monde vivant*] through the problems posed by classification, and first of all in botany, out of all embryologic preoccupation (Canguilhem et al. 2003, 109-110). Therefore, even when considering that he is one of the founders of transformism, "it is necessary to admit that the concept of evolution owes little to him, although his understanding permits the making of a reference to the concept of development (Canguilhem et al. 2003, 109). In the realm of natural history, strictly speaking, living beings do not *evolve*. They develop an already prepared trajectory. And the notion of perfection only refers to a graduation where the reference is evidently the human being (ultimately, God's shadow), deduced from its degree of resemblance to man" (Canguilhem et al. 2003, 66). With Darwin, the world acquires historicity. This, however, does not mean that now we can speak of perfection. In reality, evolution and perfection, or progress, do not imply each other: "Life has no plans or preferences; it tends to nothing, not even to its own conservation" (Canguilhem et al. 2003, 69-70). Embryology still gives us lessons of a predictable time. Between the embryo and the adult, a regular unfolding is expected. However, a different history of biology needs to be written when, with Darwin, the limits of the individual are overcome, and the species is taken as an object, but also, when the epistemological status is conferred on the environment as a decisive and *creative* factor in the species emergence and / or transformation. A true *spatial history*, in the Foucaultian sense of the expression, but with its distinction: first of all, it is not about the spaces of thought. As I have underlined above, it is geography, in its diverse disciplinary forms – geology, species geography, and ecology – which is evoked for the adventure of thinking. These disciplines, one may protest, had already existed well before 1859, even before 1759. This is true, but they did not have the same functions attributed to them afterwards. Their

[7] Auguste de Saint-Hilaire was one of these interesting figures. In 1816, he arrived in Brazil. After travelling to several south-eastern and mid-western regions, he went to the south, landing in Torres on June 5, 1820. After a few months (February 1, 1821), on the banks of the river Arroio Guarapuitã, he makes the following remarks: "Since I was not able to write this diary yesterday afternoon, I shall do it now that we have been detained for the oxen to rest. In the morning, I went out on horseback with Matias and José Mariano *to herborize* (our emphasis). For a long time, we rode along the banks of the Arroio Santana and, when crossing it, we came across pastures similar to the ones we had just seen; the grass is very green, no doubt owing to the most recent rains; it is little grown but of excellent quality; there was no flower, and the terrain is perfectly uniform" (Saint-Hilaire 2002, 239).

objects were secondary to physical space – smaller pieces of the classical age model science, mechanics. This notion of environment also had its mechanistic moment – Canguilhem examines it well in his text "Le Vivant et son Milieu", Chapter III of *La Connaissance de la Vie*. In fact, he was born in a mechanistic cradle. With Newton, this sense was sketched in trying to explain the action at a distance between physical bodies. Thus, the word *éter* appears as a "unique archetype" (Canguilhem 2009, 166). Since the *Encyclopédie*, *Milieu* article, by D'Alembert e Diderot, it has been possible to trace the presence of this concept, markedly in the scientific literature. The trajectory is similar to that of other concepts, studied by the most important French epistemologists.[8] It ranges from mechanics – with Newton, Comte, Lamarck, Geoffroy Saint-Hilaire, and Taine – to biology (and other fields of knowledge). Lamarck is often credited with the migration of the concept of environment to biology. However, our historians were *educated* to suspect the mere presence of the word. It is necessary to examine the concept and often the transformation of its meaning. We have just seen what happened to Newton. In Lamarck, the environment would still be a mechanistic figure, not essentially different from the Newtonian ether. It would be with Darwin that a radical conceptual transformation came about. Darwinian spaces not only transcend anatomy, but are dynamized, so to speak. In the Origin of Species (cf. especially Chapter 34), the essential is almost never the physical environment, not even the food environment. It is also and above all the neighbouring of the competitors and aggressors. Adaptation is expressed less in the satisfaction of desires than in a demographic fact--in short: having descendants always more and more numerous or, at least, a non-decreasing population (Canguilhem et al. 2003, 66).

I believe that this is the space, certainly poorly addressed here, where the *workgroup* discussions are concentrated. Darwin stands out as the inaugural gesture of a new era. Although the word does not even appear in the report, I allow myself to call it modernity. Several authors were summoned as witnesses to an exhausted, somehow, "perished" [*perimée*] history.[9] Since Caspar Friedrich Wolff – at the same time, *crowning* in a classic way the dealing with living beings and, perhaps, without knowing the place or promise of a new beginning,[10] through Meckel, Geoffroy Saint-Hilaire, Serres, Baer, Comte, and Lamarck[11] – in spite of the marked differences, the limits of natural history are not decidedly overcome. With Spencer but particularly with Darwin, as mentioned above, a new dawn comes about. The whole discussion is directed towards the clarification of this event: the modernity of *On the Origin of Species*.

Although I have listed a series of indicators of this *attitude of modernity*,[12] it is worth insisting further on this passage:

> In this case, it seems that the appearance of change cannot be the same for the individual in formation and for his species. The duration of an embryonic becoming has a sort of fullness and internal need, that its *constancy* for a given form is the index. Now, the history of the species is not that of an isolated system in evolution. It

[8] The studies concerning the history of the concept of reflex and regulation have become classics, both by Canguilhem.

[9] It seems that Canguilhem deals well with these Bachelardian concepts.

[10] "Ainsi, à partir de Wolff, et sans qu'il l'ait entièrement voulu, tout tableau du monde vivant fondé sur l'anatomie des êtres adultes va être secrètement mis en question"(Canguilhem et al. 2003, 25-26).

[11] "Il est bien probable qu'on s'étonnera de n'y trouver mention de Lamarck que par allusion aux divergences de doctrine enre Darwin et lui. Mais notre omission est réfléchie" (Canguilhem et al. 2003, 109). This "reflected omission" is worthy of our attention. It seems to define, first of all, an attitude towards the many histories which render Lamarck the founder of Evolutionism.

[12] I borrowed from Foucault this denomination. He says that there is not a mere chronology at stake, but an attitude, an *ethos* of the intellectual life. In the same epoch we can encounter *attitude of modernity* and, on the contrary, attitude of non- or anti-modernity.

> apparently subscribes to a more truly creative time than that of embryology, because it is a random adventure, where the path followed by a species is created by its own progression. But on the other hand, in this divided universe [*morcelé*], for these systems open to other systems, where all the changes do not occur or come about by chance, time has no worth of its own; it is neither the source nor the measure of change. The notion of an internal rhythm of evolution is generally bound up in authentic Darwinism. (Canguilhem et al. 2003, 71)

This is the whole occidental metaphysical tradition in ruins. From the 17th century we inherited the presupposition of a unique, ordered, and deterministic nature. A rigid causality runs through from end-to-end. Natural history gave us the knowledge of a fraction of this order that concerns living beings, whether it be animals or plants. Epigenesis, at the turn of the 19th century, and particularly embryology, caused the first fractures in that Laplacian dream. The embryo offers lessons other than those from mechanics. Astronomical time is not repeated here. However, even so, it is not possible to imagine temporal absence. There is always an expected trajectory of formation. Monsters only teach the circumstantiality of an interruption, or deviation, of a predictable evolutionary path. Time, there, does not create, it repeats. According to the researchers, the novelty introduced by *history* is rather radical. There is no longer a chronology that can be followed *pari passu*. When it concerns species formation, the figure of the traditional gynecologist or veterinarian is inconceivable, however much they understand their profession. When it concerns species formation (or transformation), the child is never expected. In a post-Darwin world, in short, traditional epistemological values yield their place to chance, to unpredictability, to dispersion, and to singularities. As previously seen, belief in an *internal rhythm* and the *meaning* of life makes no sense. There is no teleology either. The myth of perfection surrenders to the realism (tragic, no doubt) of finitude.

I refer to a series of witnesses who may be called *pre-Darwinian*, in the sense in which we speak of *pre-Kantian* philosophers. Likewise, can it be possible to speak of witnesses of something like a *post-Darwinism*? The Chapters VII, VIII, and IX seem to allow such a suggestion. These are, nonetheless, very imprecise conclusions. The authors are also very few: Haeckel, Fiske, Preyer, Baldwin, Huxley, and Robin. The title of Chapter IX expresses well the *atmosphere* at the end of the report: "Les incertitudes de l'épigenèse". In fact, it could also be this other one: What happened or what was done to the *Theory of evolution of species* in this first century of its existence? There is not a more incisive response. The entire interest of the workgroup seems to be this one: to approach the object of this brief history of sciences.[13] More than an author or a doctrine, it is about a concept. It is this that has a history and, for this reason, must be elucidated.

However, perhaps the post-Darwinian era has not been entirely forgotten. A certain irony goes hand in hand with the discussions – a veiled criticism of the misunderstandings of the *authentic* Darwin. First and foremost, the fate of Darwinism that goes beyond the frontiers of biology.

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[13] It does not seem superfluous to recall the conference of October 28, 1966, delivered in Montreal, "L'objet de l'histoire des sciences". The text seems to express well what is at stake when one purports to carry out a work of philosophy of science. The experience of the "travail d'équipe", at the turn of the 60s, seems to be there, between the lines of the memorable text.

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