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The Life Sciences and French Philosophy of Science: Georges Canguilhem on Norms

Abstract

Although in the last decades philosophers have increasingly paid attention to the life sciences, traditionally physics has dominated general philosophy of science. Does a focus on the life sciences and medicine produce a different philosophy of science and indeed a different conception of knowledge? Here I present a case study focussed on Georges Canguilhem. Canguilhem continued the philosophical tradition of what we now call historical epistemology, and always referred very closely to the philosophy of Gaston Bachelard. However, whereas Bachelard primarily studied the history of chemistry and physics, Canguilhem turned to the life sciences, medicine and psychiatry. I shall argue that some crucial differences in how they regarded norms, an issue seldom emphasised by Canguilhem himself or indeed by his critics, stem from the sciences on which they concentrated.

1. Introduction

Philosophers have traditionally regarded science as the exemplar of knowledge. What they have had in mind at least since Kant, however, has often been physics, rather than the sciences in general. The life sciences in particular, especially if we include as I shall do here the medical sciences, seem to have less to offer to the ambitious philosopher who aims at a universal model of knowledge as a perfectly rational enterprise, regulated by an unchanging method. Life appears to resist the demands of reason. As Georges Canguilhem put it 'reason is as regular as an accountant, life is as anarchic as an artist'.[1] Medicine has also a rather ambiguous status, and many would deny that it is a science. Its generalizations always find severe limitations, and human beings, with their unpredictability, often prevent the formation of the clear picture that some philosophers would like to obtain.

In France, the legacy of Cartesianism did not encourage the philosophy of the life sciences, both for its mechanistic approach and for its search for 'clear and distinct' ideas. Nevertheless, and perhaps as a reaction to mainstream philosophy, the philosophy of the life sciences and of medicine, though as a minority interest,

1 Georges Canguilhem, "Note sur la situation faite en France à la philosophie biologique", in: *Revue de métaphysique et de morale* (1947), pp. 322-332; p. 326.

H. Andersen et al. (eds.), *New Challenges to Philosophy of Science*,
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has blossomed in France at least since the nineteenth century. Has the focus on the life sciences produced a different philosophy of science and indeed a different conception of knowledge? This question of the impact of the science of reference on epistemology and beyond is at the core of this article. It cannot be investigated in full in this limited space, and indeed I believe that it is to be answered differently depending on the particular issues at stake. Rather, I shall present a case study focussed on Georges Canguilhem, who occupies a very central position in the history of French philosophy of the life sciences and medicine.

Canguilhem always referred very closely to the philosophy of Gaston Bachelard, and with the latter is the main representative of the philosophical tradition that we now call historical epistemology. Indeed, as he put it, it 'hardly needs saying' that his close connection of epistemology and history derived from Bachelard's 'teachings'.[2] Both Bachelard and Canguilhem always considered science in its historical development,[3] although there are some differences in the role that history of science plays in their works. Indeed, it has been famously said that while Bachelard's work is best characterised as historical epistemology, a more fitting description of Canguilhem's is epistemological history.[4] It is true that Bachelard did not produce a historical book comparable with Canguilhem's *La formation du concept de réflexe aux xvii^e^ et xviii^e^ siècles*, and that his interest in history was motivated by his epistemological concern. However, Canguilhem himself believed that in addition to being a philosopher, Bachelard was a historian if by historian of science one means the act of revealing the process of the edification of knowledge, that is to say, if by history we mean epistemological history. On the other hand, in my view Canguilhem is not less of a philosopher than Bachelard, and his *Le normal et le pathologique* is a thoroughly philosophical book.[5]

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2 Canguilhem, "Le rôle de l'épistemologie dans l'historiographie scientifique contemporaine", in: Georges Canguilhem, *Idéologie et rationalité dans l'histoire des sciences de la vie.* Paris: Vrin, 1993 [1977], pp. 11-29, p. 20.

3 For an excellent exposition of the role of history in Bachelard's philosophy, see Georges Canguilhem, "L'Histoire des Sciences dans l'œuvre épistémologique de Gaston Bachelard", in: *Annales de l'Université de Paris* 33, 1 (1963), pp. 24-39; reprinted in Canguilhem, *Etudes d'histoire et de philosophie des sciences concernant les vivants et la vie* (Paris, Vrin, 1994 [1968]).

4 For this distinction, see Dominique Lecourt, *Marxism and Epistemology. Bachelard, Canguilhem and Foucault.* London: NLB, 1975, p. 166; Jean Gayon, "The Concept of Individuality in Canguilhem's Philosophy of Biology", in: *Journal of the History of Biology* 31 (1998), pp. 205-325; p. 307, n.8; Hans-Jörg Rheinberger, "Reassessing the Historical Epistemology of Georges Canguilhem", in: Gary Gutting (Ed.), *Continental Philosophy of Science*. Oxford: Blackwell 2005, pp. 187-197. Michel Foucault applied the label of 'epistemological history' to both Bachelard and Canguilhem: Michel Foucault, *The Archaelogy of Knowledge.* London: Tavistock, 1972 [1969], p. 190.

5 Canguilhem, "L'Histoire des Sciences dans l'œuvre épistémologique de Gaston Bachelard".

I will not linger on the distinction between historical epistemology and epistemological history. What is important here is that for both of them what counts as knowledge is historical. For Bachelard the mind – or the way we think – changes in time: he dedicated books to the emergence of the scientific mind, and indeed of the 'new' scientific mind, that describe how our knowledge of the world takes different forms in different periods.[6] Epistemology, as a consequence, can only be historical. Canguilhem particularly focused on concepts, and investigated them in their historical development; he also examined how their variations impact on our way of regarding ourselves and our environment, as in the case of the concepts of the normal and pathological.[7]

In the context of this strong continuity between Bachelard's and Canguilhem's philosophies, it is interesting to investigate whether they may have been taken along different paths by their respective benchmark sciences. Whereas Bachelard focused on chemistry and physics, Canguilhem focused on the life sciences, medicine and psychiatry. Their different focuses were rooted in their respective training: before studying philosophy, Bachelard obtained a degree in science, Canguilhem in medicine. In order to investigate whether their sciences of reference produced differences in their philosophies, I shall explore one particular aspect of their philosophies, namely their approach to norms. I shall not argue that all the differences between Bachelard's and Canguilhem's philosophies are to be attributed to their sciences of reference. This would amount to overlooking their philosophical originality. However, I do think that the roots of some of their differences can be found in the sciences they studied. Their respective approaches to norms will show this.

1.1 Norms and the sciences

Some of the norms at the core of Bachelard's and Canguilhem's respective works appear not to be linked to the observation of a particular science, but rather to a general epistemological and historiographical outlook. An example is the epistemological norms that they both employed in order to judge the scientificity of theories and practices. Bachelard's view of knowledge is strictly normative: he saw an epistemological break between 'common' knowledge and scientific knowledge, and judged theories and practices as either scientific or non-scientific by using current science as his norm. It is current science that dictates what counts as

6 Gaston Bachelard, *Le nouvel esprit scientifique.* Paris: Presses universitaires de France, 1991 [1934] (Engl. tr. *The New Scientific Spirit*. Boston: Beacon Press 1984); Gaston Bachelard, *La formation de l'esprit scientifique: contribution à une psychanalyse de la connaissance objective.* Paris: Vrin, 1993 [1938] (Engl. tr. *The Formation of the Scientific Mind*. Manchester: Clinamen Press 2002).

7 Canguilhem, *Le normal et le pathologique.* Paris: Presses Universitaires de France, 1999 [1966] (Engl. tr. Canguilhem, *The Normal and the Pathological* (New York: Zone Books 1989 [1966]); Georges Canguilhem, *La formation du concept de réflexe aux xvii^e^ et xviii^e^ siècles.* Paris: Presses Universitaires de France 1955.

scientific knowledge: the epistemological norm is therefore also a historical norm, and epistemology is as a consequence historical.[8] Canguilhem adopted Bachelard's normative approach and used it in order to construct historical narratives, notably that of the concept of reflex.[9] I have discussed elsewhere the specific applications of Bachelard's and Canguilhem's normative approaches to history, as well as their differences.[10] Here, however, I do not aim to look at general epistemological and historiographical norms whose application is not connected with the specificity of a particular science. Rather, I shall investigate norms that for Bachelard and Canguilhem operate within their particular sciences. This will show whether Canguilhem's view of norms differs in any significant way from Bachelard's *because* they investigated norms in different fields. Norms are important terms of comparison because both Bachelard and Canguilhem saw them as crucial in the practice and indeed theory of science. Bachelard lamented that Henri Poincaré could not recognize the normative character of science, and rejected the latter's distinction between scientific and moral activity, based on a distinction between facts and norms.[11] As far as Canguilhem was concerned, in medicine the norms that make us judge a state as healthy or pathological are at the very core of medical science and practice.

But if Bachelard discussed norms in chemistry and physics, whereas Canguilhem discussed norms in medicine, is any comparison possible? In other words, is it not obvious that their respective representations of norms were different because

8 Bachelard's normative view of science permeates the whole of his epistemology. However, some of his works are more explicitly set out to defend his normative view, notably: Bachelard, *La formation de l'esprit scientifique*; Bachelard, *La philosophie du non. Essai d'une philosophie du nouvel esprit scientifique.* Paris: Presses Universitaires de France 1988 [1940] (Engl. tr. Bachelard, *The Philosophy of No: A Philosophy of the New Scientific Mind.* New York: Orion Press 1968; Bachelard, *Le nouvel esprit scientifique*; Bachelard, *Le matérialisme rationnel.* Paris: Presses Universitaires de France 1972 [1953], especially the last chapter.

9 Canguilhem, *La formation du concept de réflexe aux xvii^e^ et xviii^e^ siècles.*

10 Cristina Chimisso, "The Tribunal of Philosophy and its Norms: History and Philosophy in Georges Canguilhem's Historical Epistemology", in: *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 34, 2 (2003) pp. 297-327; Chimisso, *Writing the History of the Mind: Philosophy and Science in France, 1900 to 1960s.* Aldershot: Ashgate 2008; Chimisso, *Gaston Bachelard: Critic of Science and the Imagination.* London: Routledge 2001.

11 Gaston Bachelard, "Valeur moral de la culture scientifique", in: Didier Gil (Ed.), *Bachelard et la culture scientifique*. Paris: Presses Universitaires de France 1993 [1934]. Bachelard in particular lamented that a mathematician like Poincaré could not see that science is normative. Regarding the normativity of mathematics, see Debru's discussion of Jacques Bouveresse's ideas; Debru writes: 'Mathematics are the best example of a creative process based on rules and able to create new mental objects which may be used as new rules etc.', Claude Debru, "The Concept of Normativity from Philosophy to Medicine: An Overview", in: *Medicine Studies* 3 (2011), pp. 1-7, p. 2.

they were discussing norms operating in different areas? In fact, neither Bachelard nor Canguilhem regarded their examination of their respective sciences as an exercise confined just to the understanding of those sciences in question. Indeed, their examination of science was a way to learn general philosophical lessons, which was not restricted to the philosophy of science, let alone the philosophy of a particular science. Bachelard wrote not only that 'science in effect creates philosophy',[12] but even that 'reason should obey science, the most highly evolved science, science in the process of evolution'.[13] Particular sciences for both of these philosophers have something to teach philosophy. Chemistry for Bachelard should revolutionise philosophy, and lead to the destruction of metaphysics in favour of 'metachemistry'.[14] Canguilhem on his part declared that his study of normal and pathological was 'an effort to integrate some of the methods and attainments of medicine into philosophical speculation'.[15] In fact, the norms of particular sciences for them impact not only on philosophy, but indeed on how human beings should live. As I shall discuss in the next section, the norms that Bachelard observed in the practice of chemical and physics research were for him the norms that should governed our lives, both as ethical and social norms. For Canguilhem, the norms of medicine and psychiatry are aimed at determining what a normal and healthy human being is. This is why there are important aspects of their respective discussions of norms that make a comparison between their respective use of norms not only possible, but indeed crucial, both in order to understand their respective philosophies, and to investigate my initial question, namely whether a focus on different sciences produces different philosophical results.

2. Bachelard: Scientific, moral and social norms

Bachelard regarded science as a dialectic activity, indeed an activity that exhibits several types of dialectics. One type of dialectics for him takes place between the minds of the scientists: science cannot be carried out in isolation, because, according to Bachelard, it is dependent on mutual correction and indeed mutual surveillance among scientists. Interaction and correction, or rectification, ensure in Bachelard's view that individual scientists are not carried astray by their own imagination, desires and instincts, which are in fact epistemological obstacles to be overcome. For him, objectivity can only emerge out of social exchanges.[16] Sci-

12 Bachelard, *Le nouvel esprit scientifique*, p. 7.

13 Bachelard, *The Philosophy of No*, p. 122 (original: Bachelard, *La philosophie du non*, p. 144).

14 Bachelard, *La philosophie du non*, p. 52.

15 Canguilhem, *The Normal and the Pathological*, p. 34; (original: Canguilhem, *Le normal et le pathologique*, p. 8).

16 Bachelard, *Le rationalisme appliqué.* Paris: Presses Universitaires de France 1986 [1949].

entific activity, however, is also based on the interaction between the mind and the object. The mind rationalizes and rectifies the object, and the reflection on the object in turn rectifies the mind.[17] Bachelard calls this process rectification, but also purification, especially when referring to the mind. This process of rationalization and purification enables the mind to overcome its own private desires and instincts and its selfish and self-centred attitude, and to become increasingly objective and rational.[18] Moreover, science develops through a continuous polemical relation with its own past: current knowledge, in order to advance, must 'say no', in his own words, to previous knowledge, not to deny it completely, but to revise it, even radically, but always dialectically.[19] This dialectic movement of history again brings about increased rationality and decreased subjectivity.

The relationships that take place in scientific activity are also the model for social relationships in general. Indeed, the reasons why Bachelard always championed science and scientific education are profoundly moral. Michel Serres famously declared that Bachelard's epistemological obstacles are in fact deadly sins, including sloth, lust, pride and covetousness.[20] Though polemically, Serres has stressed the profoundly moral message of Bachelard's philosophy of science. Scientific activity for Bachelard 'purifies' the mind from subjective desires and selfish attitudes. The scientific mind for Bachelard exhibits 'industriousness', that he contrasts with the 'laziness' of certain obsolete philosophical minds, which stubbornly refuse to follow the most advanced science. The new philosophy will follow science; in his words: '[Rationalism] is the consciousness of a rectified science, of a science which bears the mark of human action, of the well-considered, industrious, normalising action'.[21] Scientific activity, in short, is a way not only to achieve objectivity in the knowledge of nature, but also in our social relationships. For Bachelard science produces the norms not only of its own practice, but also of moral and social behaviour.

The model of science that Bachelard had in mind was mainly borrowed from chemistry and physics. The space of the laboratory is his model for the interactions that among scientists. Indeed, the metaphor of the scientific city that Bachelard employed shows that he regarded science as an activity that take place in designated and strictly public spaces, separated from everyday life and its concerns and emotions. Indeed, Bachelard illustrated the difference between chemistry and alchemy also in terms of space: chemistry, a science, is produced in public spaces, clearly distinct from the researchers' private dwellings, whereas alchemy was practiced in private spaces, where the authority of the master prevailed over

17 "Idéalisme discursive" in: Gaston Bachelard, *Etudes.* Paris: Vrin 1970; Bachelard, *Le rationalisme appliqué.*

18 Bachelard, *La formation de l'esprit scientifique.*

19 Bachelard, *La philosophie du non.*

20 Michel Serres, "La réforme et les sept péchés", in: *L'Arc* 42 (1970), pp. 14- 28.

21 Bachelard, *Le rationalisme appliqué*, p. 123.

rationality and objectivity.[22] The practice of chemistry for him also teaches us how to understand the role of analysis and synthesis in philosophy and more generally in our understanding of the world.[23] Similarly, subatomic physics for Bachelard shows to the philosophers the nature of rationalism, which is always a 'co-rationalism', as it springs out of objective interactions. Physics, and the manner in which it reconstructs its own history, for Bachelard indicated to us the *pedagogical* importance of what he called 'recurrent' history, a history that starts from the present and 'discovers, in the past, the progressive formation of the truth'.[24] What happens if we look at other sciences, which have different procedures and different social practices? What if, like Canguilhem, we concentrate on medicine and psychiatry? The model of the laboratory does not seem to be so central any more, and the practices of the medical sciences cannot be separated from every-day life, which indeed is the field in which they operate. Would norms, not to mention philosophy of science as a whole, change when confronted with the life sciences and medicine?

3. Canguilhem: Norms and normal human beings

Norms are at the very core of Canguilhem's work; indeed, one could say, as Claude Debru has done, that '[h]is philosophy is a commentary on the idea of norm'.[25] Unlike Bachelard's, however, his concept of norm derives from a reflection on the use of norms in medicine. Against Auguste Comte and Claude Bernard, he argued that a norm is not an average but a desired state of affairs. Canguilhem's examples are in the context of the life sciences and medicine. For instance, he argued that the dramatic increase in life expectancy that has taken place in the last century in Europe is due to norms of public hygiene and better living conditions. These norms (as states of affairs to which people aim to conform) have brought about what is then expressed as a number, the 'fact' of the average life expectancy. The norms of public hygiene are valued practices, and these created what we think of as an average. A normal life span, therefore, is not something that corresponds to an average, but it is an expression of norms as values, as desired state of affairs. In other words, norms exist because human beings are normative, that is to say they are able to produce new norms. As Canguilhem put it: "[i]f we can speak of the normal man as determined by the physiologist, it is because normative men exist for whom it is normal to break norms and establish new ones".[26]

22 *Ibid*., pp. 132-133, Bachelard, *La formation de l'esprit scientifique*, p. 50.

23 Bachelard, *Le matérialisme rationnel*, p. 147; Bachelard, *Le pluralisme cohérent de la chimie moderne.* Paris: Vrin 1973 [1932], Ch. 3.

24 Bachelard, *L'activité rationaliste de la physique contemporaine.* Paris: Presses Universitaires de France, 1951, p. 26.

25 Claude Debru, *Georges Canguilhem, science et non-science.* Paris: Editions rue d'Ulm / Presses de l'Ecole normale supérieure 2004, p. 83.

26 Canguilhem, *The Normal and the Pathological*, pp. 64-65 (original: Canguilhem, *Le*

Can Canguilhem's view of norms only be applied to medicine and the life sciences? I do not think so. In fact, it is possible to draw a parallel between Canguilhem and Bachelard, despite the vastly different contexts. For Bachelard norms are also desired states of affairs: scientific norms are produced in a continuous effort to make both the object and the mind more rational. Purification and the elimination of irregularities and of variations that are not relevant to a specific scientific aim for him not only give us true scientific theories and good techniques, but also morally desirable behaviour and models of social relationships. So far, it seems that their different sciences of reference have not brought about very significant differences between Bachelard's and Canguilhem's respective views of norms. However, differences are brought into relief if we ask ourselves who produces the norms we use. For Bachelard, scientific activity produces the norms. Scientific activity is an eminently human activity, as scientists produce not only knowledge, but also scientific objects and ultimately their own minds. However, science is not produced by all human beings, or in all places: he regarded the scientific community, the 'scientific city', as it called it, and the laboratory as particularly apt ideal and real spaces respectively for rational interactions. He was not, however, completely elitist, and also proposed schools, or at least ideal schools, as the model of human interactions based on objectivity, selflessness and rationality.[27]

Canguilhem, on the other hand, looked at the norms of health and pathology, both physical and mental. He did not think that these norms could be produced by experts, these being medics or psychiatrists. For him it is the patient who knows if she suffers, and if she needs to be restored to a previous normative state. Canguilhem argued that both the healthy and the pathological state are normative states, as they both obey norms. These norms, however, are not just different, but are also more or less rigid. For Canguilhem, a healthy person is more able than a sick one to adapt to a new environment. For the sick person, changes in the environment can be catastrophic, as he is not able to create new norms that would allow him to adapt to the new situation. As Daniel Lagache put it, illness is an inferior norm because it implies a partial loss of one's normative ability.[28] For Canguilhem norms are constantly produced, and they are produced at many levels. The most general level is that of life: Canguilhem believed that vital norms dictate the preservation of life. These norms are not only shared by human beings, but by living beings in general. If human – or other – beings did not have such norms, they simply would have not survived, and would be extinct. Human beings, however, do not only live by biological norms. Their difference with other living beings is precisely that they creatively produce their own norms, which can vary quite remarkably. Social and cultural norms are crucial for their lives, and for the way in which they judge their wellbeing. This also explains why norms of wellbeing are historical:

normal et le pathologique, p. 106).

27 Bachelard, *La formation de l'esprit scientifique*, p. 252.

28 Daniel Lagache, "Le normal et le pathologique d'après M. Georges Canguilhem", in: *Revue de métaphysique et de morale* 51, 4 (1946), pp. 355-370, p. 364.

because human beings continually produce them. Social and cultural norms shape the environment, and human beings themselves. They are central in determining what counts as normal. Canguilhem even conceded that cultural norms can be at odds with vital norms. For instance, he quoted Pascal writing that good health is a perilous state for human beings, as it is a danger for their souls; illness is the state in which human beings should spend their lives.[29] In this case, the value of eternal wellbeing clashes with life's principle of self-preservation. Pascal's values on the whole are foreign to modern societies. However, many habits in modern societies go directly against preserving our health, including smoking, excessive drinking or unhealthy diets. Here other social and cultural norms interfere with the norms of struggle against disease and of the preservation of life.

Canguilhem argued that each individual is in a unique position: no individual is the same as another, and indeed what counts as normal and as pathological is not the same for different people. It goes without saying that a twenty-year old will not judge her own normal state by the same norm as an eighty-year-old, and that the country in which an individual lives and his social class and occupation would have an impact on what counts as normal. But norms apply not only to groups, but also to individuals, not only because social norms interact differently in different individuals, but also because an individual's life-style, genetic make-up, medical history as well as her individual choices and individual reactions to her environment all play a role. Canguilhem puts the individual at the very centre of medical norms. The individual is at the cross-road of vital, social, cultural and individual norms, and in each case their interaction will be different.[30]

4. Conclusion

For Canguilhem the object of medicine is the normative individual, who is a full individual who cannot be split into a 'diurnal man' and a 'nocturnal man' as Bachelard proposed in his own philosophical anthropology.[31] Bachelard's diurnal man aims to suppress his emotions and imagination in the exercise of rationality, as emotions and the imagination continuously create epistemological obstacles that have to be overcome. Bachelard did not believe that the imagination, and our desires and instincts should be suppressed completely. In fact, he thought that they should be exercised, but in a rigorously private sphere, and on an individual basis.

29 Canguilhem, *Etudes d'histoire et de philosophie des sciences concernant les vivants et la vie*, p. 409.

30 On vital and social norms in Canguilhem, see Pierre Macherey, "Normes vitales et normes sociales dans l'*Essai sur quelques problèmes concernant le normale et le pathologique*", in: F. Bing, J-F. Braunstein, and Elisabeth Roudinesco (Eds.), *Actualité de Georges Canguilhem. Le normale et le pathologique*. Paris: Synthélabo 1988, pp. 71-84.

31 Bachelard, *Le matérialisme rationnel*, p. 19.

Emotions, dreams and desires are the realm of the 'nocturnal man', that it to say each individual's private sphere. In our private reverie, for him we can let our unconscious work, but not in the social sphere, where rationality should prevail. By contrast, in Canguilhem's view of the creation of norms, no separation of rationality and emotions can be drawn, or indeed should be drawn. François Dagognet has remarked that while Bachelard wanted an 'applied rationalism' and a 'rational materialism', Canguilhem proposed a 'rational vitalism'. He rightly added that the application of medical techniques does not command the organism, and does not impose its own directives to it, but rather aids the organism's self-development.[32]

For all the parallels between Bachelard and Canguilhem, this shows a real difference. The object of medicine cannot be rectified, or purified. Their suffering, hopes and dreams cannot be bracketed, indeed the norms of medicine are the result of these emotions. Canguilhem characterized the object of medicine as follows: "The sick person is a Subject, capable of expression, who recognizes himself as a subject in all that which he does not know how to designate other than with possessives: his pain and the representation that he makes of it, his angst, his hope and his dreams."[33] For Bachelard, human beings project emotions and dreams onto their objects (obviously the objects of chemistry and physics do not have emotions independently of human beings), but in order for these objects to become scientific, these emotions must be removed. The only 'mark' that these object should bear is that of rationality. As objects become rational, they become standardized: this can be seen as a reasonable aim for the objects of chemistry and physics, but it appears to be less so when we have to consider human beings. The objects of medicine, as they cannot be 'rectified', remain individuals with all their differences and irregularities. As Paul Rabinow has written, '[I]t is suffering, not normative measurements and standard deviations, that establishes the state of disease. Normativity begins with the living being, and with that being comes diversity'.[34] For Canguilhem the norms that are at the roots of medicine are not rational, or not only rational. This does not mean that rationality is not central to his project, and indeed to medicine. As Claude Debru has commented, for Canguilhem rationality plays a role of regulation of human activities.[35] Medicine is no exception. However, Canguilhem does not insist on any clear separation between rationality and emotions, and both are central, in their different ways, to medicine. The rationalization process can only operate within the norms that are rooted in

32 François Dagognet, "Une Oeuvre en trois temps", in: *Revue de métaphysique et de morale* 90, 1 (1985), p. 32.

33 Canguilhem, *Etudes d'histoire et de philosophie des sciences concernant les vivants et la vie*, p. 409.

34 Paul Rabinow, "Introduction: A Vital Rationalist", in: François Delaporte (Ed.), *A Vital Rationalist: Selected Writings from Georges Canguilhem*. New York: Zone Books 1994, pp. 11-22, p. 16. See also Guillaume Le Blanc, *Canguilhem et le normes.* Paris: Presses Universitaires de France 1998, pp. 62ff.

35 Debru, *Georges Canguilhem, science et non-science,* p. 83.

emotions. In fact, Canguilhem referred to Bachelard on norms and value, but he referred to the valorisation of imagination, and to his work on reverie.[36]

For both Bachelard and Canguilhem knowledge and its norms are historical. However, for Bachelard scientific knowledge is the realm of rationality, which he saw as historical; by contrast, the imagination, which gives science its epistemological obstacles, does not participate in the historical development of science and rationality. Bachelard regarded the unconscious, in which our images, instincts and desires are rooted, as essentially a-historical.[37] In Canguilhem we do not find this opposition between historical rationality and a-historical emotions. He believed that what counts as normal is historical. However, what counts as normal is not the result of rational investigation alone, but rather of a complex interaction of elements that include emotions and dreams, and indeed life. His science – or technique – of choice did not allow for a clear separation between rationality on the one hand, and emotions and dreams on the other. As a consequence, he recognized that all the components of medicine are historical: norms are produced by human beings, and are therefore subject to change, no matter how much rooted in life they are. Bachelard's and Canguilhem's respective focus on different sciences creates different points of view which are often downplayed in the name of the continuity of the tradition of historical epistemology. In fact, these differences exist, and they are applicable not only to the philosophy of their respective sciences, but also to general philosophy and indeed human life. This is because both of them regarded their respective sciences as showing how philosophy should develop, and how human beings should live.

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36 Canguilhem, *Le normal et le pathologique*, pp. 176-177.

37 Bachelard, *La psychanalyse du feu*. Paris: Gallimard 1949 [1938], pp. 15-16; (Engl. tr. Bachelard, *The Psychoanalysis of Fire*, trans. Alan C. M. Ross, Boston: Beacon Press 1964 [1938]).