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EDUCATION AND DEBATE

On the scientific status of homeopathy

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Critics of homeopathy often claim that it is non-scientific. By offering adequate tools for the analysis of the foundations, structure and implications of scientific theories, philosophy of science can help to clarify this medical controversy. However, homeopathy has not yet attracted the attention of philosophers of science to any noticeable extent. Among the many topics to which philosophy of science could contribute, this paper selects two, not only for their intrinsic importance, but also because they are essential for any fruitful discussion of the rest. It is shown, first, that in homeopathy, as developed by Hahnemann, two related, but distinct theoretical levels can be identified. Then it is indicated that at least one of them — the phenomenological level — can be seen as embodying a largely autonomous research programme, on which homeopathic medical practice can rest. Finally, it is argued that this programme displays the basic theoretical and methodological traits of a genuine science, according to an influential contemporary approach in philosophy of science. Some misunderstandings involved in the debate are pointed out. *British Homeopathic Journal* (2001) **90,** 92–98.

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Introduction

It is a common pattern in the history of science that disciplines dealing with new kinds of phenomena have their scientific status questioned in the initial phase of their development. Not only their theoretical concepts, principles and methods are regarded with suspicion by the scientific establishment, but also the very reality of the phenomena is sometimes not acknowledged. Disputes can last for years or decades, until the proponents of the emerging discipline manage to develop the theory and its experimental basis beyond the threshold of what, at the time, is considered to be scientific. If they fail, the discipline is labelled 'non-scientific' and ceases to be of any concern to the scientific community.

Homeopathy constitutes a particularly interesting example of this sort of dispute, and it is curious that it has not thus far attracted the attention of philosophers of science to any noticeable extent. This paper offers a preliminary analysis of homeopathy from the perspective of contemporary philosophy of science, aiming to shed some light on the controversy over its scientific status.

The next section introduces the unspecialised reader to an important distinction between two types of scientific theories, phenomenological and constructive. In the third section we argue that homeopathy, such as developed by Hahnemann, involves theories of both kinds. Textual evidence is offered to show that Hahnemann maintained that the phenomenological homeopathic theory is largely autonomous from, and has epistemic priority over, the constructive theory. The fourth section presents a simplified account of the main philosophical views concerning the general issue of the demarcation of science from non-science, with an emphasis on Imre Lakatos's theory of science. Finally, in the fifth section we try to indicate how homeopathy, as restricted to the phenomenological level, can be analysed in the light of Lakatos's ideas. The important, but separate issue of the scientific status of Hahnemann's constructive theory will be examined elsewhere. Also lying beyond scope of the present article is the provision of experimental evidence pro or con homeopathy.[1,2]

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Theoretical levels

As the philosopher Ernest Nagel remarks in the opening paragraph of chapter 5 of his classic *The Structure of Science*,[3] 'Scientific thought takes its ultimate point of departure from problems suggested by observing things and events encountered in common experience; it aims to understand these observable things by discovering some systematic order in them; and its final test for the laws that serve as instruments of explanation and prediction is their concordance with such observations.' In the same chapter, Nagel explores an important epistemological distinction between two kinds of scientific propositions. A simplified and somewhat different exposition will be attempted here.

Bearing in mind the aspects of science mentioned by Nagel in the above quotation, one can discern in science a wide class of propositions formulating properties of entities and processes which are, in some sense, directly observable. Propositions or, more specifically, laws of this kind are often called *experimental* or *phenomenological laws*. A typical example is Boyle's law, according to which the pressure of a mass of gas kept at constant temperature varies as the inverse of its volume. Another simple example is the law of heredity stating that blue-eyed parents have only blue-eyed children. A theory containing only phenomenological laws is said to be a *phenomenological theory*. The most important examples of phenomenological theories in physics are classical thermodynamics and Einstein's theory of special relativity. In biology, one could perhaps cite Darwin's theory of evolution by natural selection.

Phenomenological theories describe systematically the phenomena of their domain, allowing us to predict the occurrence of a certain phenomenon from the occurrence of certain others. The explanatory power of this type of theory is, however, rather limited, and this often leads scientists to search for theories of another type, which one may call *constructive theories*. Contrary to phenomenological theories, constructive theories are not restricted to the observational level. Unobservable entities and processes are postulated, with the aim of providing deeper and more encompassing explanations of phenomena. These theories show how phenomena result from, or are 'constructed out' of, putative unobservable layers of reality. Constructive theories purport to afford the causal mechanisms responsible for the occurrence of phenomena, as well as for the laws described in phenomenological theories. Most theories of contemporary physics, chemistry and biology belong to this category.

From a scientific point of view, both kinds of theories are legitimate, playing specific roles in science. Sometimes it even happens that the same domain of phenomena is treated by a phenomenological theory and by a constructive theory at the same time. Thermodynamics and statistical mechanics provide the classic example of this situation. Whereas the former systematises thermal phenomena with the help of experimental notions such as temperature, energy and specific heat, the latter postulates a microscopic reality of atoms and molecules, whose mechanical behaviour would account for the phenomena described by thermodynamics, providing a better understanding of their occurrence and interdependence. In biology, many phenomenological laws of heredity, such as the one mentioned earlier, have been embedded into the contemporary constructive theory of molecular genetics.

From a philosophical point of view, however, the distinction between phenomenological and constructive theories has far-reaching implications. Given the nature of their laws, phenomenological theories are less speculative and more directly amenable to experimental test and confirmation than constructive theories. As a result, they generally enjoy a greater stability, as compared with theories of the latter kind. However, they pay a high price for this advantage: a substantial loss of unifying and explanatory power. Constructive theories are much better in this respect, but their justification raises further epistemological problems. A deep divergence among epistemologists arises from the discussion of these problems. In one camp are those who think that human knowledge *can* extend beyond phenomena, and that the reality of the unobservable entities and events postulated by constructive theories can in principle be established. Such philosophers, called *scientific realists*, typically propose that certain extra-empirical theoretical virtues, such as simplicity, unity and explanatory power, are bearers of epistemic evidence, and can, in this condition, supplement experience in the justification of unobservational propositions. This claim is disputed by the *anti-realists*, who argue that, however important, those virtues are merely pragmatic, and cannot contribute for justifying belief in the reality of the putative unobservable items of scientific theories. There is ample divergence among anti-realists themselves concerning the interpretation of constructive theories, and in particular of what is to be made of the powerful realist argument based on the notorious capacity that many constructive theories have of leading to the discovery of entirely new kinds of phenomena. The analysis of this point lies beyond the limits of this paper.†

†Chapter 6 of the previously mentioned book by Nagel contains a simple discussion of this topic. Good samples of more recent papers on the issue of scientific realism can be found in Churchland & Hooker 1985[4] and Leplin 1984.[5] The most influential contemporary criticism of scientific realism is developed in van Fraassen 1980;[6] Leplin 1997[7] offers an up to date and powerful defence of realism.

Homeopathy as a phenomenological theory

The philosophically informed reader of Hahnemann's *Organon of Medicine*[8] cannot fail to notice the explicit reference to several epistemological issues raised by the new system of medical therapy proposed in the book. Hahnemann knew that his theory had no obvious insertion into the scientific framework of his time. Being deeply influenced by empiricist epistemology, however, he clearly recognised the epistemological distinction mentioned in the preceding section, and clung to the phenomena and phenomenological laws he was convinced he had discovered. He took them as forming the essential scientific nucleus of the new discipline. Hahnemann not only favoured a phenomenological approach in homeopathy, but also was aware of its philosophical and scientific pros and cons. The main advantage is, as we pointed out in our general discussion, to minimise speculation and uncertainties, whereas the main disadvantage is a loss in explanatory power. But, in Hahnemann's judgement, the former outweighed the latter. This was, by the way, the typical view of most of those who had been developing modern science in the preceding two centuries. This does not mean, of course, that the new physics and chemistry were entirely phenomenological, but only that strong emphasis was placed on the empirical import of the new theories.

Imbued with this spirit, Hahnemann sought to develop homeopathy around a set of integrated, autonomous phenomenological principles. Subsidiarily, he framed several hypotheses about the deeper causes of vital, pathological and therapeutic phenomena. These hypotheses hinged on the concept of *vital force*, or *vital principle*, forming a consistent, qualitative constructive theory. Since he was primarily concerned with science, not philosophy, he presented and developed conjointly the two theoretical levels of homeopathy. Our thesis here is only that they can, and should, be separated for the sake of *philosophical analysis*.

To cite just a few passages from the *Organon* in which Hahnemann displays his epistemological options, let us consider, first, what he says in comment to paragraph 1. After proposing that the physician's highest, indeed *only* calling, is to heal, he adds in footnote: 'It is not to weave so-called systems from fancy ideas and hypotheses about the inner nature of the vital processes and the origin of diseases in the invisible interior of the organism (on which so many fame-seeking physicians have wasted their powers and time). Nor does it consist of trying endlessly to explain disease phenomena and their proximate cause, which will always elude him. [. . .] Surely by now we have had enough of these pretentious fantasies called *theoretical medicine* [. . .].'

As with several others pronouncements to be cited in the sequel, this one should, naturally, be tempered by our knowledge of Hahnemann's indignation at the barbaric practices and scanty success of the medicine of his time, as well as by the fact that in the same book he himself was going to embark on a major theoretical enterprise. However, these words correctly indicate the direction along which he thought his own medical theory should be developed and interpreted. The precise nature of Hahnemann's theory and philosophical position will become clearer as we proceed. Let us now quote from paragraph 6: 'The unprejudiced observer realises the futility of metaphysical speculations that cannot be verified by experiment, and no matter how clever he is, he sees in any given case of disease only the disturbances of body and soul which are perceptible to the senses: subjective symptoms, incidental symptoms, objective symptoms, ie deviations from the former healthy condition of the individual now sick which the patient personally feels, which people around him notice, which the physician sees in him.' 'The totality of these perceptible signs represents the entire extent of sickness; together they constitute its true and only conceivable form.'

After stating the basic phenomenological law of his medical theory, Hahnemann explicitly reaffirms, in paragraph 28, its priority over any possible explanation: 'Since this natural law of healing is confirmed in all objective experiments and authentic experience in the world, it is established as a fact. Scientific explanations of *how it works* are of little importance, and I see little value in attempting one. Nevertheless, the one that follows proves itself the most likely, because it is founded on experience.'

Remarks of a similar nature can also be found in paragraphs 54, 70, 100 and 144, among others. But the above passages already suffice to show how Hahnemann apportioned the relative epistemological and scientific merits of the two aspects of his homeopathic theory. Also revealing are his words in the last sentence quoted. There is, of course, a sense in which constructive theories, such as Hahnemann's vital force theory, cannot be said to be founded on experience. They are not inductively founded on experience (cf. the following section), since they involve concepts and laws going beyond the empirical level. They can nevertheless be taken to rest on experience, in the sense that their ultimate justification is provided by its ability to fit the experimental data. *Empirical adequacy* is the supreme criterion for the acceptance of any theory. Hahnemann's belief that, despite its unavoidably hypothetical character, his explanatory theory was founded on experience is, thus, entirely compatible with epistemological analysis. We are here abstracting from the *actual* support experience can give to the theory; our point is only that Hahnemann's constructive theory could in principle find genuine experimental support. It should be observed that, as in other cases in which constructive and phenomenological theories coexist, the relations of the Hahnemannian constructive theory with experience are largely mediated by the phenomenological homeopathic theory. Thus, the empirical adequacy of the former theory is to be largely judged from the empirical adequacy of the latter.

Failure to distinguish the two theoretical levels of homeopathy is responsible for serious misunderstandings in the appraisal of its scientific credentials. Thus, misgivings about Hahnemann's vital force theory or, more generally, about purported explanations of the homeopathic phenomena, are frequently taken to discredit the phenomenological homeopathic theory, leading even to disbelief in the very reality of the phenomena. On the other hand, defences of the latter often become unnecessarily embroiled with attempts to justify hypotheses about the vital force, or other explanatory hypotheses about the mechanism of action of homeopathic medicines. The founder of homeopathy is to be praised for his lucidity in keeping these issues separate. This does not mean that he failed to acknowledge the positive role constructive theories can play in science, by suggesting, for instance, fruitful directions for experimental and theoretical research.

Demarcating science from non-science

The demarcation of science from non-science, or pseudo-science, is one of the major topics in philosophy of science. The notion of science, as it is understood nowadays, emerged around the seventeenth century, when new approaches to the study of natural phenomena were created, leading to unprecedented predictive and explanatory success. The study of phenomena of different areas became more and more specialised, and several autonomous disciplines branched off from the common trunk of natural philosophy. Since then, philosophers preoccupied with the nature of human knowledge have been trying to identify the distinctive traits of such disciplines, now called the *sciences*. In contrast with many other philosophical problems, the problem of demarcation exhibits a clearly progressive history. The description of this history lies beyond the limits of this article.[‡]

However, a brief incursion into some topics belonging to the philosophy of science may help to understand certain aspects of the discussion over the scientific status of homeopathy, and will be attempted in this section and the next at the price of over-simplification.

An important pioneer in the philosophical study of science was Francis Bacon, whose main work, the *Novum Organum*, first appeared in 1620.[10] As developed by a number of philosophers and scientists in the following 200 y, Bacon's ideas contributed to the formation of a conception of science which even today is deeply entrenched in popular and scientific circles. According to this conception, science was regarded as, basically, a set of true, 'proved' propositions about the world. Science would progress through the addition of newly proved propositions to this set. The essence of the so-called 'scientific method' was identified with the process of scientific genesis. It was believed that the construction of a science began with a wide collection of observational reports, that is, particular propositions about phenomena. Observation was a process regarded as capable of complete dissociation not only from overt prejudices, but also from any theoretical presuppositions whatsoever. Only completely neutral observation was taken as genuinely scientific. Once a sufficient amount of neutral observational data was gathered, the search for scientific laws could begin. The proposal was that a sure, neutral method exists for 'extracting' laws from the experimental data. This inferential, generalising process is called *induction*.

Despite its familiarity and the grains of truth it may contain, this conception of science has been abandoned by twentieth century philosophers of science, under the pressure of logical and epistemological arguments, as well as of evidence stemming from more extensive and realistic scrutiny of the history of science. One of the first steps toward a new approach to the problem of demarcation was to realise that in the characterisation of the scientific method the process of genesis or discovery should, to a large extent, be dissociated from the process of *justification*. Scientific genesis seems to be deeply influenced by psychological, historical and contextual factors not capable of systematic treatment, and much less of guaranteeing the truth of its product. Irrespective of their origins, however, theories can be subjected to certain *a posteriori* procedures by which they gain admittance in, or are excluded from, the corpus of science. This point was underscored, among others, by Karl Popper, who further argued that not only no dependable generalising inductive procedure exists, but also that the very idea of an absolutely neutral observational basis is rather problematic. Popper's far-reaching criticism of the old conception involves several other theses, which we cannot discuss here (see references 11–13).

One of the distinguishing features of the Popperian view of science is the insistence that, prior to justification proper, theories should be examined concerning the very *possibility* of their being confronted with experience. For reasons not easily explainable in a text for a general audience, Popper formulated this demand in negative form, and ascribed to it the central role in demarcation: a theory is scientific only if it is *falsifiable*, ie, if it is *in principle* open to experimental refutation. Falsifiable theories that have not in fact been falsified are tentatively accepted, provided that

[‡]A simple, but authoritative account can be found in Chalmers 1982.[9]

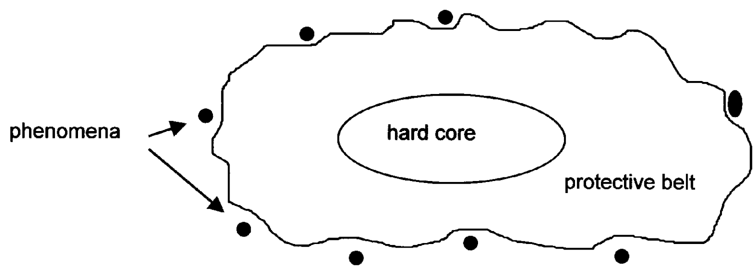

Figure 1 An illustration of the structure of a Lakatosian scientific research programme.

they also satisfy certain subsidiary conditions (some of which will become apparent in the sequel). Science progresses by the replacement of falsified theories by better, not yet falsified but falsifiable theories. Scientific knowledge is irredeemably *conjectural*.

Popper's *falsificationism* presents many advantages over the traditional conception of science, but later philosophers of science have questioned some of its central theses. One of the main attacks was launched in the early 1960s by Thomas Kuhn.[14] A more radical stand was taken by Popper's renegade pupil, Paul Feyerabend, who argued that there is no scientific method common to all scientific disciplines, and that in science 'anything goes'.[15] Another of Popper's disciples, Imre Lakatos, endeavoured to overcome the limitations of the Popperian theory while avoiding the relativism and irrationalism latent (or perhaps explicit) in Kuhn's and Feyerabend's analyses of science.

Lakatos's moderate conception of science hinges on the notion of *scientific research programmes*.[16] The central elements in such programmes are theories. Theories, however, are no longer viewed as mere sets of (purportedly) true propositions, but as highly concatenated and hierarchised webs of propositions. The fundamental propositions or laws form what Lakatos calls the *hard core* of the programme; the less central, auxiliary laws form the *protective belt*. It is through the links provided by the propositions of the belt that the fundamental laws are connected with experience. One could perhaps illustrate these concepts as in Figure 1.

Besides theories, scientific research programmes include, importantly, methodological rules, or 'heuristics', which can be either 'negative' or 'positive'. The *negative heuristic* of a programme is, essentially, the methodological decision of its protagonists to keep the propositions of the hard core unaltered throughout the development of the programme. If adverse evidence comes up, the negative heuristic recommends that accommodation should be attempted by suitable adjustments in the laws of the protective belt (and that is why it is called 'protective'). The *positive heuristic* 'consists of a partially articulated set of suggestions or hints on how to change, develop the 'refutable variants' of the research-programme, how to modify, sophisticate, the 'refutable' protective belt' (reference 16, p 135). Ordinarily, the rules forming the positive heuristic are not explicitly defined or even definable, being tacitly acquired in actual scientific practice.

Modification of the belt is part of the normal development of a scientific programme. Changes in the hard core, on the other hand, effectively amount to the abandonment of the programme, since its identity rests on the core. Episodes of this latter kind are not ruled out in science, of course, but are quite exceptional. In Kuhn's well-known expression, they are 'scientific revolutions'. Both Kuhn and Lakatos agree that the scientific community embarks on revolutions only as a last resort, when all reasonable attempts to save the programme (or 'paradigm', in Kuhn's perspective) have failed and, above all, when a viable alternative is already available. A scientific research programme is said to be *progressive* if it leads, at least from time to time, to the discovery of new phenomena; otherwise, it is *degenerating*.

Lakatos used these notions to demarcate science in a new way: '*My account implies a new criterion of demarcation between 'mature science', consisting of research programmes, and 'immature science', consisting of a mere patched up pattern of trial and error*' (reference 16, p 175). And a little later on the same page he adds: '*Mature science consists of research programmes in which not only novel facts but, in an important sense, also novel auxiliary theories, are anticipated; mature science—unlike pedestrian trial-and-error—has 'heuristic power*'.' (All italics in the original.) This criterion of demarcation is evidently more sophisticated than those previously mentioned, and its application to actual cases is both more fruitful and more difficult than the previous criteria, as Lakatos himself underlined.

The scientific status of phenomenological homeopathic theory

At the end of the third section we indicated that certain ill-founded objections to, and misguided defences of, homeopathy derive from the failure to distinguish its two theoretical levels. Another major source of confusion in the dispute over homeopathy is the attachment to 'old' conceptions of science. Thus, critics often argue that the methods by which homeopathy has been *created* are out-of-date, and that therefore homeopathic theory is groundless. On the other hand, proponents not infrequently try to justify homeopathy along naïve *inductivist* lines. The internal coherence of the homeopathic theory, its empirical adequacy, its predictive power, and other theoretical virtues of paramount importance are seldom brought to the fore, as they should be from the perspective of contemporary philosophy of science.

In discussing the scientific credentials of homeopathy it should first be observed that, like any other medical discipline, homeopathy is primarily an *art*, practice, or technique whose goal is to make sick people healthy. The putative classification of homeopathy as a science should therefore be understood only with reference to the *knowledge* of the vital, pathological and therapeutic processes underlying that practice. Should this knowledge satisfy the minimal requirements for scientific knowledge and the medical technique based on it will indirectly be entitled to be called scientific.

Lakatos's theory of science seems to constitute a particularly fruitful point of departure for the analysis of the scientific status of homeopathy. We shall now attempt a preliminary application of this theory to the *phenomenological* theory of homeopathy. The first step consists in checking if the phenomenological laws exhibit the kind of hierarchical organisation typical of any genuine science. Examining the exposition in the *Organon*, it is easy to see that Hahnemann has singled out a small handful of principles as fundamental in his theory. Of paramount importance is the principle formulated in compact form in paragraph 70: '[...] the only effective therapy is the [*homeopathic*, which] uses in appropriate dosage against *the totality of symptoms* of a natural disease a medicine capable of producing, in the healthy, symptoms as similar as possible.' This statement is often seen as encompassing three sub-laws:'

(1) *The law of similitude:* like is cured by like (paragraphs 22–28);
(2) *The law of the totality of the symptoms:* the cure is promoted by the medicine whose pathogenic effects fit the totality of the patient's symptoms (paragraphs 6, 7, 18, 22, 58, 67); and
(3) *The law of experimentation in the healthy:* the curative power of substances is to be determined by their action on healthy people (paragraphs 21, 108, 135).

It is easy to see that such an analysis of the basic homeopathic law is notoriously artificial, leading to statements with incomplete meaning. But this point does not concern us here. What is important for the present analysis is that the law, or set of laws, is entirely phenomenological, making no reference at all to unobservable entities and mechanisms. Historical studies reveal, furthermore, that the founder of homeopathy kept this principle unaltered along the development of the new theory, despite the many imperfections that characterised its initial form, as he himself acknowledged. At least one more theoretical (or, perhaps, methodological) element seems to have enjoyed this special status in Hahnemann's programme: the principle of 'unicism' (paragraphs 124, 273, 274), stating that medicines must be tested in the healthy and administered to the sick one at a time.

These principles can be taken as forming a Lakatosian hard core. The issue of which other homeopathic laws, if any, should be considered as integrating the core has obvious scientific and medical relevance. From the point of view of the present philosophical analysis, however, the question can be bypassed, since the frontier between the hard core and the protective belt in any scientific research programme is not absolute. It may happen that laws initially taken as subsidiary in a programme in the end prove to be essential and, from a certain point on, become part of the core. Changes in the opposite direction are also possible.

Hahnemann's explicit and purposeful policy of preserving the nucleus of his theory provides a good example of what Lakatos called a negative heuristic. With the advantage of hindsight, we can indeed see that Hahnemann's stubborn adhesion to the abovementioned basic phenomenological principles has been essential for the satisfactory theoretical and experimental growth of homeopathy. A positive heuristic guiding the development of homeopathy can also be identified in Hahnemann's work. In the course of his research, he found, for instance, that collateral effects of varying gravity occurred, and tried to overcome them by modifying several aspects of the process of preparation and prescription of medicines. It was in this way that he stumbled on the intriguing fact that even highly 'potentised' or 'dynamised' substances could retain their medicinal power. The use of high 'potencies' or 'dynamisations', in which no traces of the initial chemical substances are likely to be found, has been incorporated by Hahnemann (cf. paragraphs 253, 278) and by most of his followers, becoming part of the popular idea of homeopathy. Other aspects of the method of preparation of medicines and modification of the dosage have provided key points for improving the fit of theory to experience (cf. paragraphs 11a, 128, 269, and paragraphs 253a, 278, respectively). All these developments are typical of the flexibility of a protective belt. Many other auxiliary laws have been gradually incorporated by Hahnemann in his theory, among which one could cite the principles concerning homeopathic aggravation (paragraphs 157, 158, 161, 280–282); the individuation of the prescriptions (paragraphs 82, 278); the prominence of psychic symptoms (paragraphs 210–211, 217); the importance of details (paragraph

95) and of peculiar symptoms (paragraph 153); the occurrence of psychosomatic effects (paragraph 255); the laws relating 'inner' and 'external' manifestations of diseases (paragraph 201); the use of 'simple substances' (paragraph 273a); etc.

The identification and evaluation of the principles forming the nucleus and the protective belt of homeopathy is a task for medical investigators. The previous references aim merely to illustrate the hierarchical organisation of the principles of the homeopathic theory, such as conceived by Hahnemann. Coupled with the tacit or explicit methodological rules proposed by him, this theoretical structure may be regarded as forming a genuine scientific research programme. We can therefore say that Hahnemann's homeopathic theory is *potentially* scientific. It should be emphasised that this minimal scientific characterisation of homeopathy is independent of any extension of the theory to the unobservable level.

The classification of homeopathy as *actually* scientific depends, evidently, on the fulfilment of the further essential requisites of empirical adequacy and progressiveness. Again, this issue is best left to medical researchers and cannot be discussed here. It should be observed, however, that Lakatos's general demarcation criterion must be slightly modified in the case of phenomenological theories, for they cannot, by their own nature, be expected to exhibit the kind of progressiveness—the anticipation of new kinds of phenomena—that good constructive theories typically exhibit. This point is one of the many to which this paper could not do full justice. A more detailed analysis of our theme would require closer attention to the complex epistemic relations between the constructive and the phenomenological theoretical levels. This will constitute the subject of another publication.

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