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## An assessment of the scientific status of anthroposophic medicine, applying criteria from the philosophy of science

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## ABSTRACT

**Objectives:** The objective was to evaluate the scientific status of anthroposophic medicine (AM) according to demarcation criteria proposed in contemporary philosophy of science.

**Design:** Criteria for what is science were retrieved from eight publications in the philosophy of science, focusing either on science in medicine or on the demarcation between science and pseudoscience or non-science. Criteria were combined, redundancies were excluded, and the final set of criteria was ordered in a logical sequence. The analysis yielded 11 demarcation criteria (community, domain, problems, goals, axiomatic basis, conceptual basis, quality of concepts, methodology, deontic basis, research products, tradition).

**Results:** Assessing the scientific status of AM according to the 11 criteria, all criteria were fulfilled by AM.

**Discussion:** AM is grounded on the notion that specific non-atomistic holistic formative forces exist and can be empirically and rationally assessed. From a position claiming that such holistic forces cannot possibly exist or cannot be empirically and rationally assessed, the axiomatic and conceptual basis of AM can be contested. However, such an a priori rejection is problematic in the presence of empirical evidence supporting the validity of holistic concepts, as discussed in the paper. Future research should therefore focus on the tenability of the ontological reductionist position in science and on the further validation of AM non-atomistic holistic concepts, methods and practices.

**Conclusion:** In this analysis, using criteria from philosophy of science, AM fulfilled all 11 criteria for what is science.

### 1. Introduction

Anthroposophic medicine (AM) is an integrative medical system, founded in Central Europe in the early 1920s. AM is provided by physicians, therapists and nurses and integrates conventional medicine with the concepts, methods and therapies derived from anthroposophy.<sup>1,2</sup> The anthroposophic concept of man claims the human organism to be not only formed by physical (cellular, molecular) forces but by altogether four classes of formative forces: (1) formative physical forces; (2) formative vegetative forces which interact with physical forces and bring about and maintain the living form, as in plants; (3) a further class of formative forces (*anima*, soul) which interact with the vegetative and physical forces, creating the duality of internal-external and the sensory, motor, nervous and circulatory systems, as in animals;

(4) and an additional class of formative forces (*Geist*, spirit) which interact with the three others and enables the manifestation of individual mind with the capacity for reflective thinking, as in humans.<sup>3,4</sup> The interactions of these forces are understood to vary between different regions and organs in the human body, resulting in a complex equilibrium. This equilibrium can be distorted in various forms of human disease, and is sought to be regulated by anthroposophic therapies.<sup>2,3</sup>

Specific AM therapies include medicinal products, physical therapies such as rhythmical massage therapy, art therapies and movement therapies such as eurythmy therapy.<sup>5–7</sup> Since its initiation by Rudolf Steiner (1861–1925) and Ita Wegman (1876–1943), AM has developed worldwide,<sup>5</sup> its scientific status however has been repeatedly questioned.<sup>8,9</sup>

In this paper we assess the scientific status of AM, checking its

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concepts, methods and practice against criteria from the philosophy of science. This discipline conceives science as “a cognitive activity that is uniquely capable of yielding justified beliefs about the world”,<sup>10</sup>, p. ix and that is capable “to determine which beliefs are epistemically warranted”<sup>11</sup> p. 331. Theoretical and practical criteria in order to demarcate science from pseudoscience or non-science have been developed<sup>12</sup> with a focus on methods rather than on contents or doctrine,<sup>13</sup> assuming that adequate methods will result in valid knowledge. Since the 1930s, various demarcation criteria have been proposed: verification of statements<sup>14</sup>; falsification of theory<sup>15,16</sup>; development of research programs<sup>17</sup>; capability for puzzle-solving<sup>18</sup>; presence of an epistemic field, i.e. groups of people with conjoint cognitive aims and practices.<sup>19,20</sup> Criteria have referred to practice,<sup>21,22</sup> problems,<sup>23</sup> the intention for inquiry<sup>18,24</sup> and normative aspects<sup>25</sup> such as universalism, communism (sharing all produced knowledge), disinterestedness, and organized skepticism.<sup>13</sup> A *one-criterion* demarcation has been proposed,<sup>15</sup> but *multi-criteria* approaches are more often used.<sup>12,19,26</sup> Various sets of criteria, however, turned out as too narrow or too wide,<sup>27</sup> and altogether there is no consensus on the content or number of criteria, nor on their hierarchy and logical structure.<sup>13,27</sup> Consequently, a plurality of methods, systems, explanatory models, and evidence theories has been advocated.<sup>28,29</sup>

## 2. Methods

In order to test the scientific status of AM, a set of demarcation criteria was needed. As in the philosophy of science there is no consensus on which criteria to use, and to our knowledge no comparable testing of a medical system had been undertaken so far, we decided to establish a set of criteria for our analysis. Taking an inclusive and broad approach, criteria were retrieved from eight publications, thereof two with focus on science in medicine<sup>30,31</sup> and six on the demarcation between science and non- or pseudoscience.<sup>12,27,32–35</sup> Publications were chosen based on the following inclusion criteria: (1) year of publication > 2005, (2) publication includes a thorough discussion on demarcation between science and non- or pseudoscience; (3) publication is within the field of the philosophy of science or the philosophy of medicine. We stopped adding new publications after saturation was reached and no new information was provided. We combined these criteria, excluded redundancies, and ordered the criteria in a logical sequence. The final set of criteria (Table 1) was then applied to AM.

## 3. Results

In the following we describe the results of our criteria-based analysis of the scientific status of AM. For each criterion (Table 1) the corresponding AM features are outlined, in order to assess the degree of criterion fulfillment.

### 3.1. Community

AM is based in the conceptual and empirical work of Rudolf Steiner.<sup>36,37</sup> A first medical research community with physicians and pharmacists was established in the early 1920ies in Arlesheim, Switzerland, and in Stuttgart, Germany. Since then, research has been a major issue of national and international AM organizations. Today, university chairs for AM (three in Germany, one each in The Netherlands and Switzerland) and research institutes around the world examine AM. Scientists are trained in natural sciences and evidence-based medicine as well as in AM concepts and methodologies.<sup>4,38,39</sup> They use a well-structured and transparent language, as laid out in AM textbooks in different languages,<sup>40–43</sup> they communicate and cooperate among another and with other scientists; they publish in peer reviewed journals of conventional medicine, CAM or AM<sup>44</sup> and participate in research conferences on conventional medicine, CAM and AM worldwide. A large number of publications in peer-reviewed journals and

**Table 1**

Criteria for the demarcation of science and non-science, based on contemporary philosophy of science.

1. The presence of a community whose members:
  - a. have received specialized training about the domain of discourse, its concepts and its methodological basis;
  - b. communicate with and learn from each other;
  - c. use a well-structured and transparent language.
2. The presence of a domain with which a scientific community is concerned.
3. The presence of a set of problems that are specific for the domain and need to be solved by the scientific community.
4. The pursuance of a set of goals in dealing with some problems.
5. The presence of an axiomatic basis or metaphysical background that does not contain metaphoric, falsified or cryptic axioms.
6. The presence of a conceptual basis of the research field; the entirety of antecedently existing conceptual systems (concepts, descriptions, hypotheses and theories) used by the scientific community in dealing with the research domain.
7. The presence of qualitatively good concepts, according to a set of subcriteria. A concept is qualitatively good, when it is
  - a. consistent,
  - b. transparent,
  - c. in line with other scientific theories,
  - d. empirically testable,
  - e. relatively stable,
  - f. to be further developed as a result of new scientific results,
  - g. original and enriching,
  - h. with explanatory power,
  - i. without overloaded ontology.
8. The presence of a set of qualitative good concrete and abstract methods applied in scientific research as demonstrated by:
  - a. the use of reliable state-of-the-art methods of inquiry,
  - b. organized skepticism.
9. The presence of a deontic basis: a set of moral and legal rules regulating the research by prescribing what types of action are permitted, forbidden, or obligatory (e.g. disinterestedness with regard to the domain of the research field).
10. The presence of research products in the form of knowledge that is made publicly available by becoming published in journals, books or other media.
11. The research frame (the whole of domain, problems, goals, axiomatic basis, conceptual basis, methods and deontic basis) of the institution stands in a tradition of other research frames and research products, produced by other scientific research institutions.

presentations in conventional scientific conferences demonstrate the exchange of results and ideas with other scientific communities.<sup>45</sup>

### 3.2. Domain

AM regards itself as an extension of modern medicine.<sup>46–48</sup> AM physicians, therapists, and nurses are fully trained in conventional medicine, and additionally go through structured AM training.<sup>49</sup> AM covers more or less all areas of medicine including emergency and intensive care services in AM hospitals.

Specific issues of the AM domain include the epistemological foundation, development, description and validation of the concepts of AM, its working principles and medical and non-pharmacological treatments, and its diagnostic procedures; the evaluation of safety, quality, efficacy, effectiveness, and costs of AM; the integration of AM with conventional medicine; and the development, description and validation of specific AM healthcare practice-oriented evaluation methodologies.<sup>4,40–43,50</sup>

### 3.3–3.4 Problems and challenges

Major problems and challenges for the scientific AM community are<sup>45,50,51</sup>:

- the need to produce a broader range of high quality evidence on AM concepts (e.g., health, disease, treatment) and AM practice (e.g., effectiveness), and of more specific AM methods for diagnostics and therapeutic decisions;
- the paucity of financial and personnel resources compared to the

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