N.T.M. 2019 · 27:145–163
https://doi.org/10.1007/s00048-019-00208-9
Published online 7 May 2019

The Meteorology and Medicine of the Romantic Era in Context

Henrik Steffens' *Ideas on Medical Meteorology* (1811) and Its Reception by the Prussian State

Linda Richter

This article introduces to a wider public a hitherto unknown report written by the "Romantic" natural philosopher and mineralogist Henrik Steffens (1773–1845). In the 1811 report *Ideas on Medical Meteorology*, commissioned by the Prussian Ministry of the Interior via the physician Johann Christian Reil (1759–1813), Steffens argued for a new, "organic" perspective on meteorology focusing on interrelations between the atmosphere and diseases among humans and animals. This new outlook, he argued, was to be realized via a series of observations directed by the state administration. Excerpts from the report are translated and commented upon in order to illuminate their context. These show the report to be part of a significantly older European tradition of inquiry into the connection between changes in the atmosphere and health. A speculative variation of this tradition, for which the general term "Organic Meteorology" is introduced here, was ignited in German-speaking regions through Schelling's natural philosophy. The report and its context show that the Prussian state was willing to engage with "Romantic" natural philosophy, that Steffens gladly provided expertise for this purpose, and that this was part of a more general effort to professionalize medicine.

Keywords: Romantic science, Henrik Steffens, Meteorology, Johan Christian Reil, Experts, Natural philosophy, Friedrich Wilhelm Joseph Schelling

Die Meteorologie und die Medizin der Romantik im Kontext. Henrik Steffens' *Ideen über die medicinische Meteorologie* (1811) und ihre Umsetzung durch den preußischen Staat

Dieser Artikel stellt ein bisher unbekanntes Gutachten des "romantischen" Naturphilosophen und Mineralogen Henrik Steffens (1773–1845) vor. In dessen *Ideen über die medicinische Meteorologie*, die – vermittelt durch Johann Christian Reil (1759–1813) – vom Preußischen Innenministerium in Auftrag gegeben worden waren, argumentierte Steffens für eine neue, „organische" Perspektive auf die Meteorologie. Diese sollte die Beziehungen zwischen der Atmosphäre und Krankheiten unter Menschen und Tieren in den Blick nehmen. In Form einer Beobachtungsreihe, schlug er vor, sollte sie innerhalb der Strukturen des preußischen Innenministeriums umgesetzt werden. Exzerpte aus dem Gutachten sind übersetzt und kommentiert worden, um deren Kontext zu beleuchten. Diese zeigen, dass das Gutachten Teil einer deutlich älteren europäischen Wissenstradition war, die sich mit der Verbindung zwischen Änderungen in der Atmosphäre und Gesundheit befasste. Eine spekulative Variante dieser Tradition, für die hier der umfassendere Begriff "organische Meteorologie" eingeführt wird, wurde durch Schellings Naturphilosophie im deutschsprachigen Raum neu befeuert. Das Gutachten und sein Kontext beweisen, dass der preußische Staat die Expertise eines "romantischen" Naturforschers nutzte, dass Steffens diese bereitwillig zur Verfügung stellte und dieser Vorgang Teil eines umfassenderen Professionalisierungsstrebens in der Medizin war.

Schlüsselwörter: Romantische Naturforschung, Henrik Steffens, Meteorologie, Johann Christian Reil, Experten, Naturphilosophie, Friedrich Wilhelm Joseph Schelling

Electronic supplementary material
The online version of this article (https://doi.org/10.1007/s00048-019-00208-9) contains supplementary material, which is available to authorized users.

Between July 1817 and February 1820, the Prussian central government had regional governments conduct parallel observations of the weather and diseases. That weather and climate possibly influenced the health of living organisms in one way or another has been suspected in medicine since antiquity. *Airs, Waters and Places* of the Corpus Hippocraticum remained an important reference point for many also in the seventeenth and eighteenth centuries. Weather and climate conditions were part of a larger bundle of environmental factors thought to be correlated with cycles of disease among humans and animals (Janković 2010; Riley 1987). Early modern miasma theory, which assumed "bad air" to be the cause of diseases, was a related phenomenon (Riley 1987: 18–19; Temkin 2007: 51–57). The "neo-hippocratic" school of thought represented, among others, by Thomas Sydenham (1624–1689) inspired several observation series in England (Rusnock 2002a: 109–136; Rusnock 2002b), France (Mendelsohn 2011; Hannaway 1972) and the Netherlands (Zuidervaart 2005) over the course of the eighteenth century. The scientific or medical societies conducting these series sought to empirically establish the atmosphere's influence on living beings by linking weather observations with health records. Although, for example, the Société Royale de Médecine (1778–1793) in France developed an elaborate technique for phrasing "general observations" (Mendelsohn 2011: 396), no regularities, natural laws or practical help for doctors could reliably be identified based on the results of this strictly inductive approach. The Prussian observations, on the other hand, diverged from this earlier tradition in two significant ways: rather than being based on private initiatives, they were rooted in the state's interests and dependant on its structures. In addition, they did not follow an inductive approach, but were—as this article is going to illustrate—rather grounded in speculative natural philosophy (albeit more in theory than in practice). Only the initial conception of the observation series can be covered here. Still, this helps to shed light on the influential political position "Romantic" doctors and naturalists enjoyed in Prussia at the time.

In 1811, the German physician Johann Christian Reil (1759–1813) approached the Prussian Statistical Bureau with a suggestion to extend and improve meteorological observations. The Bureau, a subdivision of the Ministry of the Interior, had been founded in 1805 and reformed in 1810, serving as a collection point for data gathered by different state ministries (Schneider 2013: 34–41). To Reil, the thermometer and barometer readings sent in monthly from the provinces as part of the so-called News Reports (*Zeitungsberichte*) were "in their current form not very promising."[1] Reil's words carried weight because he had been elected dean of the medical faculty of the new University of Berlin and was also head of the Scientific Deputation for Medical Matters (*Wissenschaftliche Deputation für das*

Medicinalwesen). This group of medical experts advised the Prussian Ministry of the Interior in questions of health policy. As such, the Deputation was a symptom of the efforts undertaken by medical practitioners to establish themselves as an academic and scientific discipline—a process closely tied to political reform (cf. Wahrig 2004: 678).

Conveniently, Reil could also provide a contact he thought capable to give counsel: the natural philosopher and trained mineralogist Henrik Steffens (1773–1845). The report Steffens subsequently wrote as a response to the instructions of Reil is entitled *Ideas on Medical Meteorology* (*Ideen über die medicinische Meteorologie*). Reil then commented on Steffens' report in a separate manuscript before forwarding it to the Statistical Bureau. Some of his comments and interpretations will also feature in this article, but Steffens' *Ideas* are at the centre. Both manuscripts are stored in the Secret State Archives Prussian Cultural Heritage in Berlin-Dahlem. To the best of my knowledge, neither their existence nor their contents have been known to historians of science and medicine. The same is true for the documents relating to the planning process which ensued and the actual observation series conducted in Prussian Governmental Districts (*Regierungsbezirke*) between 1817 and 1820. Five comprehensive volumes of correspondence bear witness to this project. Further material from the ensuing observation series will be published elsewhere.[2] Complete transcripts of the original German version of both Steffens' *Ideas* as well as Reil's accompanying report are available online as a supplement to this article. The goal here is to introduce the report to a wider public by providing their key points transcribed, translated and contextualized. For the *Ideas* neatly tie together three aspects relevant to historians of science and medicine of the early nineteenth century. They shed some more light on the disputed relationship between Steffens and Reil and show their conjoint effort to act as policy advisors within the Prussian state administration. Most importantly, however, they illustrate a distinctly "Romantic" view on the interdependency of the atmosphere and living organisms. This challenges narratives of a linear development of meteorology from superstitious astrology to the physics of the atmosphere it became in the late nineteenth and early twentieth century. Instead, it highlights the shortcomings of this empirically-based science that the more speculative approach put forward by Reil and Steffens was supposed to remedy. At the same time, this benefited efforts to conflate scientific theory and medical training to boost the status of doctors.

"Romantic" Naturalists and the Atmosphere

Steffens was part of a larger group of scientists who were deeply impressed by Friedrich Wilhelm Joseph Schelling's (1774–1854) writings on natural philosophy around 1800. This group, often called "Romantic" scientists, included Johann Wilhelm Ritter, Johann Christian Ørsted—and Steffens. Reil is a well-known exponent of a similar following which developed in medicine (e.g. Mocek 1995; Roelcke 1999). Although they (as well as the wider "Romantic" phenomenon extending to the fine arts) are notoriously difficult to pin down on one common programme (Knight 1990: 14; Höppner 2017: 55; Engelhardt 1999: 91–99; Köchy 1997: 74), it is safe to say that they called for introducing new, holistic methods in science and medicine guided by philosophical principles. They believed nature and the human body to be similarly complex organisms, therefore relying on similar structures. Because of that, they thought it possible to infer hypotheses on natural laws without empirical work, but only by way of analogy and speculation, that is, with their minds.

Although there is no shortage of historiography on this movement observed in German states and other countries around this time,[3] little attention has been paid to the fact that the atmosphere was to Schelling and his followers the epitome of a highly complex entity that mechanical explanations had repeatedly failed to explain. "No part of natural philosophy", wrote Schelling in *On the World Soul* (1798), "shows more strikingly than meteorology how little experiments suffice to investigate the workings of nature in its totality" (Schelling 1798: 135). He saw, however, great potential in further developing this area of study as "the key to a whole new natural philosophy" (Schelling 1798: 128). Because the atmosphere enveloped all natural processes, it was the most convenient starting point to finally understand them (ibid.). In a similar vein, Achim von Arnim lauded the atmosphere as a subject matter which forced scientists out of their laboratories and into nature (Wiesenfeldt 2011: 54).

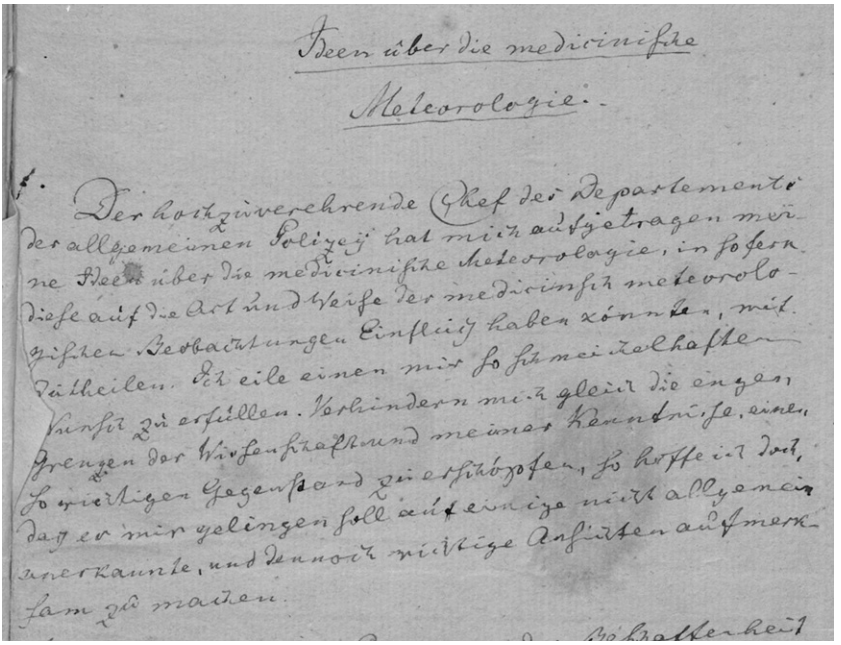
Born in Stavanger, then part of the kingdom of Denmark-Norway, Steffens had studied mineralogy in Copenhagen in the 1790s. During this time, he later recalled, he struggled to relate the knowledge thus acquired with other aspects of nature more generally and found solace in Schelling (Steffens 1844, vol. 3: 318). The *Ideas* discussed here developed further some ideas Schelling had expressed in *On the World Soul*. Although Steffens published a great number of writings on a variety of topics, he seems never to have published the *Ideas*. Although parts of the *Ideas* have been printed before, they were wrongly attributed to Reil's authorship. After the physician's death from typhoid in 1813, his unpublished papers were collected, edited and published by Reil's son-in-law Peter David Krukenberg, and the

fellow medical doctor Christian Friedrich Nasse (Reil 1816). A significant part of the chapter on the atmosphere as an external cause of disease consists of verbatim extracts from Steffens' report (ibid., vol. 3: 95–118). Did Reil plagiarize this chapter from the conveniently unpublished report? Or did the two editors come across a handwritten copy of the report in Reil's estate and misattributed it by accident? The evidence is inconclusive. That Steffens is thus established as the author of a portion of Reil's later writings on natural philosophy and medicine answers to those who were previously puzzled as to whether to ascribe these to the influence of Schelling or Steffens (cf. Mocek 1995: 17–18).

Immediate Context of Steffens' Report

After Reil had sent his request to improve the state's weather observations to the Statistical Bureau in late May 1811, the Bureau's head, Johann Gottfried Hoffmann, granted him permission to consult with Steffens in this matter. The report the Norwegian mineralogist responded with is not dated, but related archival material suggests that it was written sometime in June of 1811. Reil's initial letter, which is not part of the archival records, reached Steffens in Halle, where he was a professor of physics at the university (this was where he had met Reil before the physician was appointed to a professorship in Berlin). Although the university in Halle had been reopened in the French-controlled Kingdom of Westphalia three years prior in 1808, few students attended Steffens' lectures. He therefore received very little in listener's fees (Steffens 1844: 5). Because Steffens' finances were "not the best", Reil requested permission from Hoffmann to pay him 50 *Talers* for his service.[4] In his otherwise very detailed autobiography, published in ten volumes between 1840 and 1844, Steffens did not mention the report. Only vaguely did he recall that around the year 1810 he revived his earlier interest in the weather (Steffens 1844, vol. 6: 57).

The result of his more philosophical examination of the subject filled 36 pages of narrow script. He wrote in almost flawless German composed in Latin handwriting (Fig. 1), whereas many of his contemporaries who were native speakers used the Kurrent script when writing in German. The difference is starkly apparent when comparing Steffens' writing with that of Reil in the second manuscript (Fig. 2). In characteristically long and meandering sentences, Steffens outlined his take on the general principles of atmospheric processes and on how meteorological observations ought to be conducted to match them. He structured his report in four sections, including: (1) an account of the history of meteorology, which


Ideen über die medicinische
Meteorologie.

Der hochzuverehrende Chef der Departementi
der allgemeinen Polizey hat mir aufgetragen mei-
ne Ideen über die medicinische Meteorologie, in sofern
diese auf die Art und Weise der medicinisch meteorolo-
gischen Beobachtungen Einfluß haben könnte, mit-
zutheilen. Ich eile einen mir so schmeichelhaften
Auftrag zu erfüllen. Verhindern mich gleich die engen
Grenzen der Wissenschaft und meiner Kenntnisse, einen
so wichtigen Gegenstand zu erschöpfen, so hoffe ich doch,
daß es mir gelingen soll auf einige mir allgemein
anerkannte, und dennoch wichtige Anstalten aufmerk-
sam zu machen.

Fig. 1 First page of Steffens' report *Ideas on Medical Meteorology*, circa June 1811. (© Geheimes Staatsarchiv Preußischer Kulturbesitz, Sign. I. HA Rep. 76 Kultusministerium VIII A, Nr. 2291, fol. 11r)

showed the failure of earlier theories to explain the laws of the atmosphere and the need for a new perspective, (2) six "proofs" (which other people might call speculation) to support his thesis that the atmosphere was a living organism, (3) suggestions to modify meteorological observations, and (4) thoughts on different local factors influencing the weather at any given place. Translated excerpts of key parts from the first three follow, along with a brief contextualizing commentary for each.

The Necessity for a Fresh Perspective in Meteorology

Source

Geheimes Staatsarchiv Preußischer Kulturbesitz, I. HA Rep. 76 Kultusministerium VIII A, Nr. 2291 "Acta von Anstellung und Benutzung der Meteorologischen Beobachtungen Vol. 1 vom Juli 1811 bis alto April 1818", fol. 11r–28v (excerpts, translated by Linda Richter).

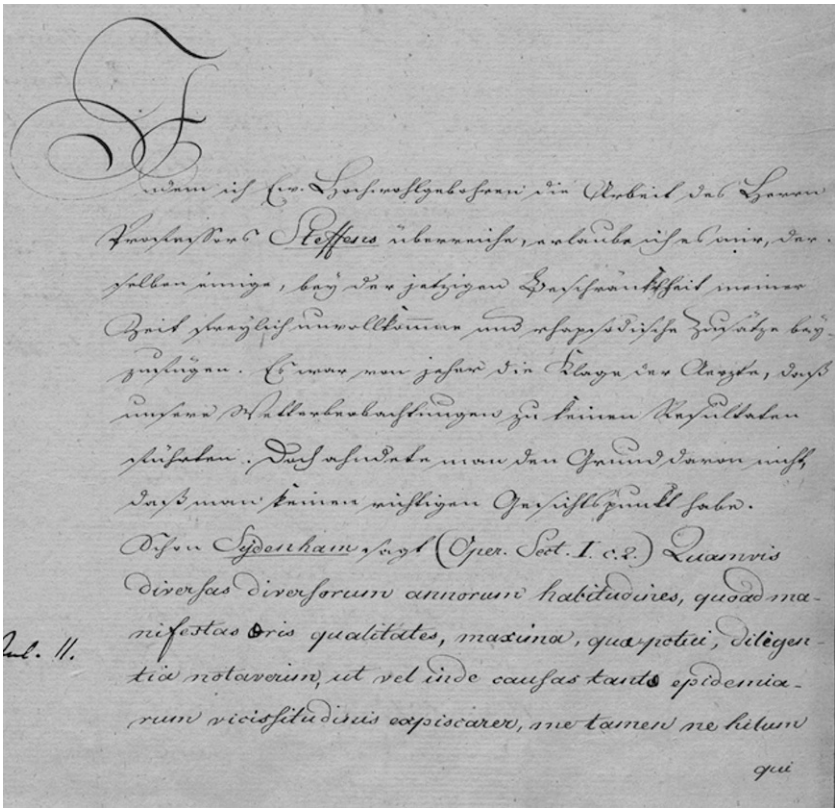


Fig. 2 First page of the letter Reil wrote to accompany Steffens' report, 8 July 1811. (© Geheimes Staatsarchiv Preußischer Kulturbesitz, Sign. I. HA, Rep. 76 Kultusministerium VIIIA, Nr. 2291, fol. 2r)

Translation

[fol. 11r:] What one knew in earlier times of the composition of the atmosphere was little, incomplete, and informed by all sort of reveries. As is well known, *horror vacui* played an important role in all explanations. It is an observation in its own right, which leads us to important contemplations, if we assume that certain epochs are conducive to certain directions of the human mind. Several distant causes extend their hands to one another, inform each other and the most momentous results emerge out of this unexpected union. The most important discoveries in the middle of the seventeenth century, which followed in quick succession [fol. 11v:] opened a seemingly infinite field for the investigation of the atmosphere. […] The manometer was developed to measure changes in the density of the atmosphere, the barometer to measure pressure, the thermometer helped to determine the degrees of heat and cold with precision, as

did the hygrometer for the degrees of humidity of the atmosphere. All of these observations were connected systematically, thus creating a discipline of physics (Aërometry) first designed by [Christian] Wolf, in which the names [Horace-Bénédict de] Saussure und [Jean-André] De Luc stand out remarkably.[5]

These discoveries also influenced medicine. One determined the temperature of sickrooms, the baths[;] one discovered the median temperature of blood, and their increase and decline in various diseases[;] one observed the influence of lowered pressure in the thinner mountain air on the organisation of healthy and sickly conditions[;] one determined with greater precision the effect of humidity and dryness in the atmosphere. Meanwhile, no one could fail to notice that many things were still mysterious, that indeed the discovered properties represented merely the outward appearance, and did not reveal not the inner character and the actual make-up of the atmosphere.

[fol. 13r:] Such was the state of our knowledge of the atmosphere when pneumatic chemistry ([Antoine de] Lavoisier's admirable discovery) brought about a great revolution in all of science. [fol. 13v:] Particularly the knowledge of the composition of the atmosphere was much increased. The discoveries of chemistry related primarily to the varieties and characteristics of different gases and promised the greatest and most important insights into the character of the atmosphere. […]

[fol. 15v:] Neither the chemical nor the mechanical view can solve the mystery of the composition of the atmosphere. There remains a third view, which we assumed earlier and have presented before, the necessity of which we will explain as briefly as possible as well as its influence on medical meteorology and the direction of observations. It is the *organic* view.

Commentary

Steffens started by laying out his view on the previous history of meteorology: after a phase of quantified measurement of the air ("the mechanical view") came another phase of chemical inquiry—neither of which provided answers that satisfied him. And indeed, the preceding century had been characterized by a futile search for the causes of changes in the atmosphere, frustrating the naturalists and doctors engaging in time-intensive instrumental weather observations (Daston 2008: 247). Thus, to characterize the previous history of meteorology as a history of its failings was not a mere straw man. This neatly tied in with Steffens' conviction that nature and history developed in stages, ever-increasing in complexity (Engelhardt 1999: 102–105). Within this line of reasoning, it was thus not far-fetched to expect a future meteorology, which would be able to meet the complex

structure of the atmosphere with an equally complex system of empirical observations, grounded in and guided by philosophical speculation.

A well-known problem in the history of "Romantic" science and medicine has been the fierce backlash against it, largely propelled by positivist scientists like Justus Liebig or Matthias Jacob Schleiden in the 1840s and onward (cf. Liebig 1840; Schleiden 1844). It is not clear, who first used the attribute "Romantic" when referring to this school of thought, but it seems likely that it was intended to be derogatory (Köchy 1997: 69). Although the value and influence of this movement has been debated, it does not seem fair to simply reproduce this bellicose term. It was certainly not a self-description. Schelling had coined the term "speculative physics" and co-edited a journal with Steffens using that name.[6] As seen above, the self-assigned term used by Steffens in the *Ideas* was "organic". Rather than to speak of "Romantic Meteorology", I will henceforth use the phrase "Organic Meteorology" to denote the approach advocated by Schelling, Steffens and Reil. In addition to avoiding the ideological baggage of the term "Romantic", speaking of "Organic Meteorology" has a second advantage: it opens the possibility to identify continuities with earlier ideas. Despite the rhetoric of renewal, it was rooted in a range of traditions and discourses that preceded Schelling. The excerpted passages from the *Ideas* show that Steffens was at least roughly familiar with neo-hippocratic medical research. What was needed, as far as he was concerned, was a new, speculative perspective—but the aim was very much alike: to find out how living organisms interacted with the atmosphere. What was it that Steffens proposed?

"Organic Meteorology"—in Theory

Translation

[fol. 15v:] *First proof.* When inorganic bodies mix, a third neutral body emerges[;] both bodies proof equally powerful in their union, restrict each other, and their peculiarities are cancelled to the same degree. An organic body is one which, in spite of mixing with other bodies, maintains its peculiar features[;] all peculiar features of the ingested parts disappear in the strong individuality of the organization, which is not restricted, limited in its original composition or changed but consolidated in its initial peculiarity. The same is true for the atmosphere. […]

[fol. 16r:] *Second proof.* As inorganic bodies destroy each other when they are in conflict, organic parts mutually maintain each other. Acids and bases neutralize each other, but the nervous system, the vessel system, the

muscle and skin systems mutually maintain themselves in their relationship. All organic bodies live in an organic relationship with the atmosphere. […]

[fol. 16v:] *Third proof.* […] When organic bodies influence each other in a damaging manner, that influence cannot be attributed to a visible substance but the damaging agent is some kind of vital function which damages directly and attacks almost always, more or less momentarily, the entirety [fol. 17r:] of an organic system. Narcotic vapours of plants, the saliva of rabid dogs and snake poison work like this. With these, one cannot detect the substance to which the damaging influence could be attributed. The same is the case for the atmosphere. […]

Fourth proof. All inorganic bodies in a chemical operation fade into a finite product, whereas all organic bodies maintain their constant make-up by continuously reigniting the process. If we look at the atmosphere as a whole, one cannot deny that the same is the case.

Fifth proof. Only with organic bodies do we find regular oscillations stemming from the whole of the organization [fol. 17v:], which one can distinguish from the accidental, irregular, partial, and which do not result from outer, merely mechanical but from inner conditions that are a result of the individual life of the organization. […]

[fol. 20v:] *Sixth proof.* As the different products fall into the abyss of conformity of organic bodies, the most varied bodies develop out of them. That this is the case with the atmosphere is proven by meteor stones and similar productions, the atmospheric origin of which is of no doubt.

Thus, it is to be viewed as proven that an organic life takes place in the atmosphere. […]

[fol. 21r:] We do not deny that air, although organic, is different from the other organic bodies. The so-called organic structure is missing. How—they will say—an organization without organs, is the nature of the organism without its form? We answer with another question: what *is* the principal form of organization? […] We are forced to call a whole organic which excites itself, which maintains itself in a constant form, which pours itself out in many different products, shapes itself on the inside always in the same manner through never resting, always changing processes. To be in the being, to persist in the change, is that not the main feature of all organization and where more prominently that in the atmosphere? We do know that the view we propose makes the observations more difficult, seemingly entangles the task further, but [fol. 21v:] is simplicity to be assumed when nature does not show it?

Commentary

In this section of the report, Steffens laid out his key conviction: that the way the atmosphere was working provided compelling evidence for the fact that it was a living being. With the help of analogies to vital processes in other organisms, he claimed that the atmosphere ate, digested, breathed, regenerated and reproduced itself. If one assumed this to be true, any kind of connection between human and animal health and the atmosphere was the result of an interaction between at least two, possibly many more living organisms. To think about the atmosphere in that way could, in his view, provide pointers toward areas of interest for further empirical research. As he indicated in the paragraph on the effect of physical investigation of the atmosphere on medicine, he did not think that, for example, ventilating sickrooms was wrong. The problem to him was rather that no one understood why it worked. So far, he proposed, meteorological observations had failed to represent the complexity of the epistemic object it investigated—a complexity which lay in the atmosphere itself and which ought to be mirrored in the observations. By proposing an "organic" approach to meteorology, he hoped to shed light on interconnections and the causes of sickness that were elusive to quantification by instruments and statistics. If measuring minutiae had failed, he reasoned, why not approach the matter in a fundamental and more abstract fashion?

This concept of the atmosphere as a living being also ties in with contemporary discourses on the nature and purpose of the medical profession in German countries. Bettina Wahrig has convincingly argued that the theoretical exploration of what it meant to be an organism was tied to extensive bureaucratic reforms both on the state and the local level—a process which enabled university-trained doctors to become an elite among medical practitioners (Wahrig 2004: 678; cf. also Wiesing 1995; Broman 1996). Reil's final plea for reforming medical training at Prussian universities in his accompanying report exemplifies his hope for improving the quality of medical care by aligning it with the sciences (cf. on this also Broman 1996: 120–122), thus restricting access to the upper echelons of the medical profession. By knowing so little about the atmosphere's influence on health, Reil wrote,

> the doctor is ignorant of what he should know best if he wants to claim true knowledge and base his actions on that knowledge. […] A better education in medicine must take higher physics as a starting point because it is nothing but the application of physical truths. This requires schools to be organised accordingly and pioneering men who have appropriated the true spirit of science.[7]

To think of the atmosphere as alive, however, did neither begin nor cease with Steffens' writing. Reil bolstered Steffens' claim by tracing its lineage back to Johannes Kepler. To put him in the tradition of a scientific authority like Kepler was supposed to further legitimize the daring claims put forward in the report. "What such a man [as Kepler] writes", Reil triumphed, "can hardly be an insanity!"[8] He went on to quote a passage from *Harmonice mundi* (1982 [1619]) in which Kepler claimed that the earth was a wild, sometimes dangerous animal.[9] In the same chapter, Kepler developed an analogy of a human body and the earth to justify astrological predictions. If humans reacted to the aspects and earth was equally alive, then it must likewise react to certain planetary constellations—the reaction being changes in weather (Kepler 1982 [1619]: 256–267). Certainly, a key difference between Kepler's and Steffens' suggestions was that the former conceived of the entire earth to be one organism (the atmosphere being its soulful shell). Steffens, on the other hand, maintained that the atmosphere was a separate organism engaging with others. At the same time, Steffens spoke of the activities of a "grand organism" (*Totalorganismus*), leaving open the possibility that several organisms formed a larger whole by their interaction. One cannot help but notice a similar claim of earthly life in the so-called *Gaia hypothesis* put forward since the 1970s by James Lovelock, Lynn Margulis and others (e.g. Lovelock 2016 [1979]). How and when such theories appeared and declined, to what end they were advanced and how—if at all—they referred to each other remain open questions beyond the scope of this essay.

"Organic Meteorology"—in Practice (?)

Translation

[fol. 22r:] In life, organization is infinite, its functions ever changing, as is its connection with the atmosphere, it shares all its oscillations, more or less clearly. Any deviation in [fol. 22v:] the organization (disease) that springs from its whole, causes a different situation in the atmosphere[;] any deviation in the atmosphere that more or less springs from the whole causes a different situation in the organization. The goal of all medical meteorological observations can be nothing else but to grasp this vital interaction as clearly as possible. That the air can be lighter or heavier, hotter or colder, more humid or dry, is a very superficial observation which obviously does not become any more thorough if we report the degree of heaviness, warmth or humidity. Whatever the physicist may look for, his observations are useless for the physician. […]

The suggestions which arise immediately from the reported view are the following:

1. One must be attentive to the life of the atmosphere in its entirety. In this regard, the oscillations of the barometer are of the utmost importance. Doctors of different countries must connect with each other—the farther apart they are, the more instructive the results will be. The state of the barometer will be noted precisely. Their comparison will fix the speculation mentioned above as fact and is thus [fol. 23r] particularly important. […] Comparative observations in opposite hemispheres of the earth would be even more important, and because summer and winter excite each other, would be inevitable for secure results. Perhaps they are more to be wished than to be hoped for. […] Such observations must be combined with medical observations. Oftentimes general diseases are connected to such universal constitutions of the atmosphere, often this or that disease, depending on its individual nature, is modified by it. [fol. 23v:] It is obviously a new field of study not yet conquered. […]
2. One must be attentive to all organic interactions in the grand organism. Whether a summer is favourable to the vegetation or suppresses it, increases the production of insects, is doubtlessly important for medico-meteorological observations, as is the state of the instruments, because it obviously results from a more intimate relation more akin to the organic. The attentive observer regards a wide range of manifold perceptions, the influence of which on medicine only the future may show.
3. The partial, only local conditions, which stem from the particular situation of individual areas, must be precisely separated during the observations, to which the strict and pure perception of the general will contribute. That from the latter come many diseases is known, is natural. For swampy, dry, high, low, desolate, forested areas, sea banks, areas distant from the sea all have their respective types, but their particularities can only by determined in opposition to the generalities.

Commentary

Only at this point in his report did Steffens explicitly mention how he envisioned the connection between human and animal health and the weather to work. Basically, he thought of them both as mirroring each other—any "deviation" in the normal workings of one had to result in a similar effect in the other. Of course, this explanation was vague and evoked more questions than it answered. What constitutes a "deviation" in the atmosphere? Does the mirroring process include a kind of ongoing feedback mechanism, with deviations bouncing back and forth? If not, when and how does it stop? If the repercussions were visible "more or less clearly",

what did these gradations depend on? If Steffens were able to respond, he might claim that it was precisely those kinds of questions he sought answers for. On the other hand, his confident expectation that a comparison of barometer readings would "fix the speculation mentioned above as fact" raises doubts as to how open he would have been to empirical results contradicting his theory.

Regardless of what the merits or shortcomings of this goal were, it is important to note that Steffens did strive toward confirming his claims in an empirical manner. As "Romantic" naturalists and philosophers put such a strong emphasis on the value on hypothesizing and speculation, their different attitudes toward empirical work tend to be overlooked. Many of them, including Steffens and even Schelling, insisted that empirical proof had to follow speculation and, in principle, that it also had the power to disprove speculation (Haberkorn 2004: 236; Höppner 2017: 58; Köchy 1997: 319–321). How often such a confirmation process was adhered to and whether it was even possible to prove (or disprove) vague and grandiose statements such as Steffens' in any meaningful way is, of course, debatable.

On a related note, we see in the translated excerpt that Steffens also hoped that organic weather observations could bring about practical uses in medicine. In fact, the lack of practical use derived from instrumental observations and the excessive concern with details of precision measurement were a source of concern to him. This position was at odds with historians and positivist scientists who emphasised "Romantic" departure from practicality (Köchy 1997: 268). On the other hand, Schelling's roughly contemporary views on medicine did indeed dismiss practical matters as banalities far beneath his status as a philosopher (Broman 1996: 74). Whereas historians of "Romantic" medicine have unearthed a range of attitudes on this issue (Wiesing 1995; Tsouyopoulos 1982) the same question has so far not been investigated with similar scrutiny for "Romantic" natural science.

Any Prussian bureaucrat confronted with Steffens' report would presumably have had a hard time realizing his advice with concrete measures. Nevertheless, Hoffmann was impressed enough with Steffens' report to request from him an instruction as well as a model table for the observers in September 1811.[10] Unfortunately, the armed conflict with France led the Prussian government to abandon this project shortly thereafter. One can therefore only wonder whether Steffens would have been able to translate his speculations into an empirical program. When the project was taken up again after the war, a somewhat cumbersome planning process began in 1814 and observations finally commenced in the summer of 1817. The series was in place for about two years and fell, perhaps unsurprisingly, short of Steffens' ambitions. First, it was restricted to the Prussian territory. This had increased after the war to include, for example, the Rhine province,

but was still a far cry from bringing together "doctors from different countries" to compare data over big distances. Second, Prussia's doctors proved to be very reluctant to commit to regular instrumental weather observations. Medical officers in cities or counties, which the Ministry of the Interior had wished to enlist for this purpose, announced that their numerous duties required them to travel, often by foot, to locations within their assigned city or county to administer inoculations, perform autopsies or visit poorhouses. For this reason, they could not reliably attend to their instruments three times a day, as would have been required. Aside from other such organizational hiccups, a third shortcoming of the series was the lack of any discernible plan on how to evaluate the observed data, let alone relate them to Steffens' natural philosophy. After a failed attempt to transfer the management of the observations to the Berlin Academy of Science, the project was finally abandoned in early 1820.[11]

Significance of the Report

The point of view Steffens' *Ideas* provided was that of a speculative "Organic Meteorology". This approach built both on previous philosophical (Kepler) as well as medically informed inductive approaches (Société Royal de Médecine and others) to the workings of the atmosphere and its relations with living beings. Schelling's natural philosophy did not invent the idea of a living, complex atmosphere interacting with the organisms it surrounded, but it certainly gave new momentum to it. Whereas Steffens never went public with his report, other similar authors at the time did. Karl Konstantin Haberle and Karl Wilhelm Gottlob Kastner were "Organic" meteorologists who published equally ambitious books and journals on their theories.[12] They shared, however, with Steffens an utter lack of empirical proof for their claims.

The files from the subsequent observation series prove that contrary to earlier research on knowledge production within the Statistical Bureau (cf. the claim by Schneider 2013: 41), meteorological observations were indeed conducted in Prussian administrative structures. That Steffens was consulted as an expert in the early stages of this observation series, sheds new light on both parties involved. Using state infrastructure for knowledge production and advising the government in this undertaking complicates Steffens' attitude toward the ideal relationship between academic research and the state. In writings on this specific question, written and published around the same time, he argued for a strict separation of both (Bergner 2016: 75–77). In practice, however, he was perfectly happy to advise the

Prussian state and to reflect on ways to use state infrastructures for empirical research. The fact that Reil facilitated this relationship points to his powerful political position and to the report's relevance for putting medicine, with the help of the state, on a more scientific basis. Regarding technical questions relevant to the state, it was so far stressed that the academic culture in Berlin was pervaded by the idea of useful knowledge, far removed from the wild speculations circulating in Jena around Schelling (Klein 2015: 19–20; cf. also Klein 2016)—a claim not transferable to the field of medicine and meteorology. Although the actual observations only ensued a few years later, Steffens' draft of an "Organic Meteorology" was advice which he was glad to give and the Prussian state administration was glad to take.

Acknowledgements

I thank Moritz Epple, an anonymous reviewer and the editors of NTM for reading earlier version of this article and their generous comments.

Endnotes

1 Letter from Reil to Hoffmann, 21.05.1811, GStAPK I. HA, Rep. 77 Ministerium des Innern, Tit. 94, Nr. 10, fol. 11r. Within Prussian bureaucratic structures, these handwritten reports were intended to keep the central government and ultimately the king up-to-date on current affairs in the provinces, including the weather (Mellies 2008). It was up to the respective local administration, however, whether to use instrumental data collected or to describe the weather in a qualitative manner. This quote and all following quotes from German texts were translated by the author.

2 Two chapters of my PhD thesis on the field of weather knowledge in German countries more generally are, at least in part, dedicated to this observation series. A slightly revised version of the thesis is due to be published by *Campus* later in 2019 under the title *Semiotik, Physik, Organik. Eine Geschichte des Wissens vom Wetter (1750–1850).*

3 The list of readings is potentially quite long. Comprehensive overviews and points of departure are Cunningham & Jardine eds. (1990); Köchy (1997); Beiser (2003); Engelhardt (2008). Steffens's life and scholarly work have also been researched in terms of his political activities and beliefs (Bergner 2016), intersections with his extensive literary work (Höppner 2017: 535–704; Haberkorn 2004: 233–261) and his relevance for introducing "Romantic" ideas to Scandinavia (Lorenz & Henningsen eds. 1999).

4 Letter from Reil to Hoffmann, 21.5.1811, GStAPK I. HA, Rep. 77 Ministerium des Innern, Tit. 94, Nr. 10, fol. 11r. A handwritten note on Reil's commentary indicated that Hoffmann authorized this payment to be made (Reil's commentary to Steffens' report, 8.7.1811, GStAPK I. HA, Rep. 76 Kultusministerium VIIIA, Nr. 2291, fol. 2r).

5 The two Swiss scholars Saussure (1740–1799) and Deluc (1727–1817) are household names in the historiography of meteorology (cf. Shaw 1926: 126; 129). Both were particularly interested in questions of evaporation and precipitation, publishing comprehen-

sive treatises in the 1780s (Saussure 1783; Deluc 1787). They were bitterly at odds with each other about the best way to measure humidity and developed rivalling hygrometers made of whalebone (Deluc) and human hair (Saussure) (Sigrist 2011). The appearance of Christian Wolff (1679–1754), on the other hand, is unusual. Among his wide range of philosophical writings, those on the natural world are less known than those on law and religion which made Wolff a controversial figure in Enlightenment scholarly circles and politics (e.g. Israel 2001: 541–562). The writings Steffens presumably referred to (Wolff 1709; Wolff 1710, vol. 2: 379–411) outlined experiments and instruments to "measure air" (Wolff 1710, vol. 2: 383). He covered the air pump, the barometer, the thermometer and a wind gauge, referencing, of course, the works of Guericke, Boyle, Mariotte and Torricelli. That Steffens mentioned Wolff and not those authors, who in hindsight seem like more obvious choices, is perhaps due to his predilection for philosophically informed experimentation.

6 This was *Zeitschrift für speculative Physik*, of which two volumes appeared in 1800 and 1801.

7 Reil's commentary to Steffens' report, 8.7.1811, GStAPK I. HA, Rep. 76 Kultusministerium VIIIA, Nr. 2291, fol. 9r.

8 Ibid., fol. 3r.

9 Ibid.

10 Letter from Hoffmann to Reil, 25.9.1811, GStAPK I. HA, Rep. 76 Kultusministerium VIIIA, Nr. 2291, fol. 30r.

11 All of this is covered in much greater detail in my PhD thesis which includes a chapter on "Organic Meteorology" more generally and problems which occurred in planning and running the series, cf. EN2.

12 Haberle published both a short-lived journal (*Meteorologische Hefte für Beobachtungen und Untersuchungen zur Begründung der Witterungslehre*, 3 vols., 1810–1812) as well as two volumes of a textbook: *Meteorologisches Jahrbuch zur Beförderung gründlicher Kenntnisse von Allem, was auf Witterung und sämmtliche Lufterscheinungen Einfluß hat* (1810–1811). For further information on Haberle's meteorology see Wiesenfeldt (2011). Similarly, Kastner published three volumes of his *Handbuch der Meteorologie* (1823–1830) and edited the journal *Archiv der gesammten Naturlehre* (1824–1829), later renamed *Archiv für Chemie und Meteorologie* (1830–1835). For further information on Kastner, albeit little information on his meteorological work, see Kirschke (2001).

Sources

Geheimes Staatsarchiv Preußischer Kulturbesitz [Secret State Archives Prussian Cultural Heritage]

- I. HA, Rep. 77 Ministerium des Innern, Tit. 94, Nr. 10
- I. HA, Rep. 76 Kultusministerium VIIIA, Nr. 2291

References

Beiser, Frederick C. 2003. *The Romantic Imperative. The Concept of Early German Romanticism.* Cambridge: Harvard University Press.

Bergner, Marit 2016. *Henrich Steffens. Ein politischer Professor in Umbruchzeiten 1806–1819.* Frankfurt am Main: Peter Lang.
Broman, Thomas 1996. *The Transformation of German Academic Medicine, 1750–1820.* Cambridge: Cambridge University Press.
Cunningham, Andrew and Nicholas Jardine (eds.) 1990. *Romanticism and the Sciences*. Cambridge: Cambridge University Press.
Daston, Lorraine 2008. Unruly Weather. Natural Law Confronts Natural Variability. In: Lorraine Daston and Michael Stolleis (eds). *Natural Law and Laws of Nature in Early Modern Europe. Jurisprudence, Theology, Moral and Natural Philosophy*. Burlington: Ashgate: 233–248.
Deluc, Jean-André 1787. *Idées sur la météorologie*, 2 vols. Paris: Duchesne.
Engelhardt, Dietrich von 1999. Henrik Steffens im Spektrum der Naturwissenschaft und Naturphilosophie in der Epoche der Romantik. In: Otto Lorenz and Bernd Henningsen (eds.). *Henrik Steffens: Vermittler zwischen Natur und Geist*. Berlin: Berlin Verlag: 89–112.
Engelhardt, Dietrich von 2008. Naturwissenschaft und Medizin im romantischen Umfeld. In: Karin Tabben and Friedrich Strack (eds.). *200 Jahre Heidelberger Romantik*. Berlin: Springer: 499–516.
Haberkorn, Michaela 2004. *Naturhistoriker und Zeitenseher: Geologie und Poesie um 1800. Der Kreis um Abraham Gottlob Werner*. Frankfurt a. M.: Peter Lang 2004.
Hannaway, Caroline 1972. The Société Royal de Médecine and Epidemics in the Ancien Regime. *Bulletin of the History of Medicine* (46): 257–273.
Höppner, Stefan 2017. *Natur / Poesie: Romantische Grenzgänger zwischen Literatur und Naturwissenschaft Johann Wilhelm Ritter, Gotthilf Heinrich Schubert, Henrik Steffens, Lorenz Oken*. Würzburg: Königshausen & Neumann.
Israel, Jonathan I. 2011. *Radical Enlightenment. Philosophy and the Making of Modernity 1650–1750.* Oxford: Oxford University Press.
Janković, Vladimir 2010. *Confronting the Climate: British Airs and the Making of Environmental Medicine*. Hampshire: Palgrave Macmillan.
Kepler, Johannes 1982 [1619]. *Weltharmonik*. 4th edition. Translated by Max Caspar. München: Oldenbourg.
Kirschke, Martin 2001. *Liebigs Lehrer Karl W. G. Kastner (1783–1857): Eine Professorenkarriere in Zeiten naturwissenschaftlichen Umbruchs.* Berlin: Verlag für Geschichte der Naturwissenschaften und Technik.
Klein, Ursula 2015. *Humboldts Preußen: Wissenschaft und Technik im Aufbruch*. Darmstadt: WBG.
Klein, Ursula 2016. *Nützliches Wissen. Die Erfindung der Technikwissenschaften.* Göttingen: Wallstein.
Knight, David 1990. Romanticism and the Sciences. In: Andrew Cunningham and Nicholas Jardine (eds.). *Romanticism and the Sciences*. Cambridge: Cambridge University Press: 13–24.
Köchy, Kristian 1997. *Ganzheit und Wissenschaft: Das historische Fallbeispiel der romantischen Naturforschung*. Würzburg: Königshausen & Neumann.
Liebig, Justus 1840. *Über das Studium der Naturwissenschaften und über den Zustand der Chemie in Preußen.* Braunschweig: Vieweg.
Lorenz, Otto and Bernd Henningsen (eds.) 1999. *Henrik Steffens: Vermittler zwischen Natur und Geist*. Berlin: Berlin Verlag 1999.
Lovelock, James 2016 [1979]. *Gaia. A New Look at Life on Earth*. 2nd edition. Oxford: Oxford University Press.
Mellies, Dirk 2008. Die amtlichen Zeitungsberichte der preußischen Regierungen als Quelle einer Mentalitätsgeschichte der Verwaltung des 19. Jahrhunderts. *Forschungen zur Brandenburgischen und Preußischen Geschichte* (18): 1–17.
Mendelsohn, J. Andrew 2011. World on a Page. Making a General Observation in the Eighteenth Century. In: Lorraine Daston and Elizabeth Lunbeck (eds.). *Histories of Scientific Observation*. Chicago: University of Chicago Press: 396–420.
Mocek, Reinhard 1995. *Johann Christian Reil (1759–1913). Das Problem des Übergangs von der Spätaufklärung zur Romantik in Biologie und Medizin in Deutschland.* Frankfurt am Main: Peter Lang.

Reil, Johann Christian 1815–1816. *Entwurf einer allgemeinen Pathologie*, 3 vols., ed. Christian Friedrich Nasse (vol. 1) and Peter Krukenberg (vol. 2 and 3). Halle: Curt.
Riley, James C. 1987. *The Eighteenth-Century Campaign to Avoid Disease.* Basingstoke: Macmillan.
Roelcke, Volker 1999. *Krankheit und Kulturkritik. Psychiatrische Gesellschaftsdeutungen im bürgerlichen Zeitalter (1790–1914).* Frankfurt am Main: Campus.
Rusnock, Andrea 2002a. Hippocrates, Bacon, and Medical Meteorology at the Royal Society, 1700–1750. In: David Cantor (ed.). *Reinventing Hippocrates*. Aldershot: Ashgate: 136–153.
Rusnock, Andrea 2002b. *Vital Accounts. Quantifying Health and Population in Eighteenth-Century England and France*. Cambridge: Cambridge University Press.
Saussure, Horace-Bénédict 1783. *Essais sur l'hygrométrie.* Neuchâtel: Fauche.
Schelling, Friedrich Wilhelm Joseph 1798. *Von der Weltseele. Eine Hypothese der höhern Physik zur Erklärung des allgemeinen Organismus.* Hamburg: Friedrich Perthes.
Schleiden, Matthias Jacob 1844. *Schelling's und Hegel's Verhältniss zur Naturwissenschaft.* Leipzig: Engelmann.
Schneider, Michael C. 2013. *Wissensproduktion im Staat: Das königlich preußische statistische Bureau 1860–1914*. Frankfurt am Main: Campus.
Shaw, Napier 1926. *Meteorology in History.* Cambridge: Cambridge University Press.
Sigrist, René 2011. Scientific Standards in the 1780s. A Controversy over Hygrometers. In: John Heilbron & René Sigrist (eds.). *Jean-André Deluc. Historian of Earth and Man*. Geneva: Slatkine: 147–183.
Steffens, Henrich 1840–1844. *Was ich erlebte. Aus der Erinnerung niedergeschrieben*, 10 vols. Breslau: Max.
Temkin, Owsei 2007. Eine historische Analyse des Infektionsbegriffs. In: Philipp Sarasin, Silvia Berger, Marianne Hänseler and Myriam Spörri (eds.). *Bakteriologie und Moderne. Studien zur Biopolitik des Unsichtbaren*. Frankfurt am Main: Suhrkamp: 44–67.
Tsouyopoulos, Nelly 1982. *Andreas Röschlaub und die romantische Medizin*. Stuttgart: Fischer.
Wahrig, Bettina 2004. Globale Strategien und lokale Taktiken. Ärzte zwischen Macht und Wissenschaft 1750–1850. In: Richard van Dülmen and Sina Rauschenbach (eds.). *Macht des Wissens: Die Entstehung der modernen Wissensgesellschaft.* Köln: Böhlau: 655–680.
Wiesenfeldt, Gerhard 2011. Carl Constantin Haberles Versuch der Begründung der Meteorologie als Wissenschaft. In: Andreas Christoph and Olaf Breidbach (eds). *Die Welt aus Weimar. Zur Geschichte des geographischen Instituts.* Jena: Ernst-Haeckel-Haus: 51–59.
Wiesing, Urban 1995. *Kunst oder Wissenschaft. Konzeptionen der Medizin in der deutschen Romantik*. Stuttgart: frommann-holzboog.
Wolff, Christian 1709. *Aerometriae Elementa, in quibus aliquot Aëris vires ac proprietates juxta methodum Geometrarum demonstrantur*. Leipzig: Lanckisch.
Wolff, Christian 1710. *Der Anfangs-Gründe Aller Mathematischen Wiessenschaften*, 4 vols. Halle: Regner.
Zuidervaart, Huib J. 2005–2006. An Eighteenth-Century Medical-Meteorological Society in the Netherlands: An Investigation of Early Organization, Instrumentation and Quantification. *British Journal for the History of Science* (38): 379–410; (39): 49–66.

Linda Richter
Goethe University
Frankfurt/Main
Germany
l.richter@em.uni-frankfurt.de