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8 From Kant to Schelling: Metaphysics of Nature and the Rise of Modern Science

Abstract: This chapter claims that Schelling's *Ideas for a Philosophy of Nature* is a continuation of Kant's attempt at working out a metaphysics of nature. By metaphysics of nature, I take Kant to mean an intermediate domain of investigation between philosophy and science. I argue that Schelling, like Kant, ascribes to such a metaphysics the task of elaborating a concept of matter suitable to meet the challenges posed by the rise of modern science. Yet I suggest that both authors focus on different challenges: Kant on the mathematization of nature and Schelling on the transformable character of nature.

Keywords: Kant, Schelling, Metaphysics of Nature, Science, Mathematization, Transformation.

1 Introduction

'Metaphysics of nature' sounds like an outdated expression from a time when the natural sciences were not yet fully developed and left room for philosophical speculation about natural phenomena. This impression is probably due to the negative connotation of the term 'metaphysics' throughout most part of the nineteenth and twentieth centuries. Such a bad reputation has often been described as a lasting consequence of Kant's critique of metaphysical speculations. Yet, as it has been noticed in the literature, the specific phrase 'metaphysics of nature' was probably used for the first time by Kant himself,[1] who suggests that the new philosophy resulting from his *Critique of Pure Reason* should be divided into *metaphysics of nature* and *metaphysics of morals* (A 841/B 869).[2] The notion of a metaphysics of nature, on which Kant further elaborates in his 1786 *Metaphysical Foundations of Natural Science*, appears at a time when philosophers were struggling to determine the specific role of philosophy in relation to the emergence and rapid development

1 Falkenburg 1987, p. 9.

2 Throughout this chapter, I follow the translations in Cambridge edition of Kant's *Critique of Pure Reason* (Kant 1998) and Kant's *Metaphysical Foundations of Natural Science* (Kant 2004).

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of modern science.[3] In my view, the conceptual challenges posed by the rise of modern science are key not only to Kant's conception of a metaphysics of nature, but also to Schelling's project of a philosophy of nature.

The first sketch of Schelling's philosophy of nature is formulated in his 1797 *Ideas for a Philosophy of Nature*. Several commentators have contributed to highlighting the importance of Kant's philosophy for the emergence of Schelling's project. These scholars generally agree that the latter emerges from a challenge posed by Kant's transcendental philosophy. They disagree, however, on the specific nature of this challenge. Some argue that it concerns the underlying unity of intelligence and nature, which is suggested, but not entirely worked out, by Kant's *Critique of the Power of Judgment*.[4] For others, such a challenge consists rather in the problems posed by the interaction between the intellect and experience in Kant's critical philosophy as a whole.[5] Finally, there are those who focus on the issue of the transition from *a priori* concepts to the empirical domain in Kant's *Opus Postumum*.[6] Surprisingly, Kant's *Metaphysical Foundations of Natural Science*, which is by far the book with which Schelling's *Ideas* engages the most, has received less attention from the literature.[7]

Di Giovanni is an exception in this regard, as he considers both Kant's *Metaphysical Foundations* and Schelling's *Ideas* as attempts at "a transition from the transcendental principles of experience in general to the particular principles of

3 Bonsiepen claims that 'Metaphysik der Natur' as well as 'Naturphilosophie' are German translations for 'philosophia naturalis', which was a mixture of science and philosophy that comprised "cosmology, teleology as the doctrine of organisms, and psychology" (Bonsiepen 1997, p. 13).

4 Förster focuses especially on "Schelling's principle of the identity of nature and spirit", which Schelling is said to extract "from § 76 of the KU" (Föster 2018, p. 241). Schmied-Kowarzik agrees that "Schelling's entire natural philosophy is shaped by the KU" (Schmied-Kowarzik 1996, p. 23).

5 Beiser, for instance, argues that "Naturphilosophie grew out of a deep aporia in the Kantian system – namely, its failure to explain the interaction between the intellectual and sensible, the noumenal and phenomenal" (Beiser 2006, p. 7). Wild goes in a similar direction by framing the main Kantian problem leading to Schelling's project as the "crisis" of transcendental philosophy due to its inability to fully explain the relationship between "reflection and experience" (Wild 1968, p. 12).

6 Di Giovanni sees this challenge as the one of accounting for the transition "from transcendental principles" to the "principles of an actual science of nature", a problem Kant is said to have addressed in the notes for a book "which would have dealt precisely with the subject of an *Übergang*" (Di Giovanni 1979, p. 203). Similarly, Thomson argues that Kant's *Opus Postumum* and Schelling's *Ideas* share the common aim of carrying out a transition from an "*a priori* concept of nature" to "the empirical realm of physics" (Thomson 2022, p. 105).

7 If the *Critique of the Power of Judgment* is never explicitly mentioned in Schelling's *Ideas*, Kant's *Metaphysical Foundations*, as Manfred Durner notices, "is directly mentioned about 20 times", while "it is referred to indirectly several other times" (Durner 1991, p. 75). Durner, However, does not elaborate on the reasons for Schelling's systematic engagement with this work.

a science of nature" (Di Giovanni 1979, p. 197). Whereas I do not disagree with Di Giovanni's description of this challenge faced by Kant and Schelling, I believe the problem of a transition reflects a broader issue, namely, the relationship between philosophy and the emergence of modern science. I take the project of a philosophy of nature elaborated by Schelling in 1797 to be an inheritor of Kant's philosophy in that it seeks to reassess the role of philosophy in view of the rapid development of the natural sciences.[8] I claim accordingly that Schelling's *Ideas*, like Kant's *Metaphysical Foundations*, tackles this issue by elaborating a domain of investigation that occupies an intermediate position between philosophy and science, namely, *the philosophy or metaphysics of nature.*[9]

The aim of this chapter is twofold: (1) to show that Schelling's *Ideas* is best understood in light of Kant's metaphysics of nature; and (2) to reconstruct the role that Schelling envisioned for such a metaphysics in 1797. I have discussed elsewhere Schelling's views on the relationship between the principles of this metaphysics of nature and the more formal principles of transcendental philosophy.[10] In this chapter, by contrast, I shall focus on the relationship between metaphysics of nature and the empirical sciences. More precisely, I intend to show that both Kant and Schelling ascribe a similar role to such a metaphysics of nature, namely that of *elaborating a concept of matter suitable to meet the challenges posed by the emergence of modern science.* However, I take Schelling to depart from Kant by focusing not on the challenges posed by the mathematization of nature, but rather on those that arise from a conception of nature as something transformable.

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8 Jelscha Schmid has recently argued that Kant's transcendental philosophy and Schelling's philosophy of nature share the same research program of rendering metaphysics scientific (Schmid 2022, p. 19). Whereas I agree with her on this general thesis, I focus here less on the scientific character of metaphysics than on the specific ways in which philosophy should engage with the emerging empirical sciences.

9 To my knowledge, the only author to have addressed Schelling's project of a philosophy of nature from this perspective is Wolfgang Bonsiepen. However, he takes Schelling to have carried out a speculative enterprise "based on a negative assessment of the possibilities of modern natural science" (Bonsiepen 1997, p. 557). To this "speculative philosophy of nature", which Bonsiepen associates not only with Schelling but also with Hegel, he opposes the "mathematical philosophy of nature" of Kant and Fries (Bonsiepen 1997, p. 13), which is said to engage with "the positive foundations" of modern science (Bonsiepen 1997, p. 557). In his view, the latter model would be better suited to tackle modern challenges such as the "skepticism in relation to instrumental reason" and the "increased awareness of ecological problems" (Bonsiepen 1997, p. 25). Contrary to Bonsiepen, I do not take Schelling's project to be based on a negative assessment of the sciences; in my view, Schelling rather tried to take seriously the philosophical challenges posed by the emergence of modern science.

10 Garcia 2024.

I begin, in sections 2 and 3, by reconstructing Kant's elaboration of a field of investigation between philosophy and science. This will lay the grounds for my argument, in section 4, that Schelling's 1797 *Ideas for a Philosophy of Nature* emerges from the same set of problems as Kant's metaphysics of nature. Section 5 focusses on what I consider to be the most original element of Schelling's approach in 1797, namely, his focus on the transformable character of nature.

2 Kant's Metaphysics of Nature

The relationship between Kant's philosophy and the history of science has long been a subject of discussion among Kant scholars.[11] Kant's *Metaphysical Foundations of Natural Science* is a key book in this regard, as it appears to occupy an intermediary position between Kant's philosophy and what he took to be the most important tenets of the science of his time. Accordingly, Kant describes his *Metaphysical Foundations* as responsible for establishing "the principles of the possibility of a mathematical doctrine of nature" (AA 04: 473), which indicates that he took mathematics to be a fundamental feature of the science of his time. By contrast, Kant claims that the *Metaphysical Foundations* is "a separated metaphysics of corporeal nature" that does "indispensable service for general metaphysics" in that it "furnishes examples (instances *in concreto*) in which to realize the concepts and propositions of the latter" (AA 04: 478). By general metaphysics, Kant understands, as he clarifies in what follows, "transcendental philosophy" (AA 04: 478). Kant's small treatise thus attempts to provide natural science with principles or foundations and transcendental philosophy with concrete instantiations.

The specific way in which Kant understands these notions of *foundations or principles of natural science* and *instantiation of transcendental philosophy* has been a subject of constant debate among Kant interpreters. Commentators can roughly be divided into two camps: those who follow Buchdahl's proposal of a "looseness of fit" between transcendental philosophy, metaphysics of corporeal nature, and natural science;[12] and those who, to use Allison's expression, try to "tight-

11 See, for instance, the discussion between Dieter Schöneker, Dennis Schulting, and Niko Strobach (Schöneker et al. 2011) on Kant's famous comparison of his own new approach to metaphysics with "the first thoughts of Copernicus" (B xv).

12 In Buchdahl's words, the *Metaphysical Foundations* consists in "demonstrations of possibility – to be understood perhaps in the loose sense of displaying how much in these laws mirrors the general concepts and principles of a science" (Buchdahl 1969, p. 678).

en the noose" between the three domains.[13] If the fit is loose, the *Metaphysical Foundations* furnishes *additional confirmation* for the concepts and principles treated in the *Critique*[14] and a *regulative model* for natural science.[15] If the noose is tight, the *Metaphysical Foundations completes* the argument of the *Critique*[16] and *establishes the conditions of possibility* of the science of its time, that is, Newtonian science.[17] Some commentators try to steer a middle course by loosening the fit in relation to the *Critique* and tightening the noose in relation to natural sciences.[18] Without going into too much detail in this discussion, I shall provide a general picture of the role of Kant's metaphysics of corporeal nature in relation to metaphysics of nature as a whole and to science. This general picture

13 Allison himself, who formulates the notion of 'tightening the noose' as opposed to 'loosening the fit', sides with Buchdahl and criticizes Friedman for "tightening the noose, since he attempts to demonstrate the inseparability of Kant's transcendental claims from their connection with Newtonian physics" (1994, p. 81).

14 Pollok for instance claims that the *Metaphysical Foundations* neither realizes the objective reference of the categories nor limit their scope of validity to phenomena, but rather "liefern für beide Intentionen das nächtsliegende Modell" (Pollok 2011, p. 172); in the same vein, Sturm affirms that the book "presents important concretizations of Kant's doctrines of synthetic *a priori* conditions of empirical cognition but is not necessary to complete transcendental philosophy" (Sturm 2022, p. 15).

15 For Buchdahl thus the *Metaphysical Foundations* is "best viewed as a model for the construal of the idea of a metaphysical ('explicative') component of science" (Buchdahl 1986, p. 157).

16 Förster argues that the *Metaphysical Foundations* is required to prove the objective validity of the categories (Förster 1987; 2018, pp. 77–78); Westphal, in his turn, argues that the *Metaphysical Foundations* is required to justify the analogies of experience (Westphal 1995, p. 44).

17 This argument is canonically developed by Friedman (1986; 2013).

18 This has been done for instance by Watkins, who claims, on the one hand, that "in the *Metaphysical Foundations* Kant does not necessarily assume or even use the first Critique's Principles in a systematic way", and, on the other hand, that Kant's argument does establish "the conditions necessary for an object of outer sense to be possible" (Watkins 1998, pp. 572, 577); in the same vein, Pollok sees the *Metaphysical Foundations*, on the one hand, as a model for realization of the *Critique* and, on the other hand, as a book that provides a constitutive theory of matter (Pollok 2011, pp. 71, 172). As for Friedman, even though he tends to tighten the noose between Kant's *Metaphysical Foundations* and Newtonian physics, he tries to steer a middle course between both camps as concerns the relationship between transcendental philosophy and the *Metaphysical Foundations* in the conclusion of his classical commentary. Hence, he claims that "the realization or instantiation of the transcendental principles of the understanding in the special metaphysics of corporeal nature is indeed indispensable and therefore privileged, for it is the one and only such instantiation that fully realizes the transcendental principles in the phenomenal world. It does not follow, however, that the main argument of the *Critique* requires completion in the *Metaphysical Foundations.* Rather, the two works have different yet complementary perspectives on this same phenomenal world, about which they establish different yet complementary conclusions" (Friedman 2013, pp. 563–564).

should suffice for my purpose of presenting the challenges from which I believe Schelling's philosophy of nature emerges.

In the Architectonic chapter of the *Critique of Pure Reason*, Kant claims that "metaphysics is divided into the metaphysics of the speculative and the practical use of pure reason and is therefore either metaphysics of nature or metaphysics of morals" (A 841/B 869). He adds that "metaphysics of speculative reason", that is, metaphysics of nature, "is that which has customarily been called metaphysics in the narrower sense" (A 842/B 870). For Kant, this metaphysics in the narrower sense "consists of transcendental philosophy and the physiology of pure reason" (A 845/B 873). Transcendental philosophy is "a system of all concepts and principles that are related to objects in general, without assuming objects that would be given (Ontologia)". Physiology "considers nature, i. e., the sum total of given objects" and is further divided into "immanent and transcendent" (A 845/B 873). Transcendent physiology consists in the "physiology of nature in its entirety" (rational cosmology) and in the physiology of the "the connection of nature in its entirety to a being beyond nature" (rational theology) (A 846/B 874). Immanent physiology, in its turn, "considers nature [...] as it is given to us [...] in accordance with *a priori* conditions" and is subdivided into the "metaphysics of corporeal nature" (rational physics) and the "metaphysics of thinking nature" (rational psychology). Based on these distinctions, Kant arrives at "the entire system" of his metaphysics in the narrower sense or metaphysics of nature (A 847/ B 875).[19]

I agree with interpreters who consider Kant to be drawing here on the distinction between general metaphysics and special metaphysics.[20] From this perspective, transcendental philosophy, which replaces the old ontology, is analogous to general metaphysics as it treats of objects in general. Physiology of pure reason, in its turn, is an analogue of special metaphysics, in that it is an application of general metaphysics to specific objects: to the body (rational physics), to the soul (rational psychology), to the world (rational cosmology), and to God (rational theology). Since rational cosmology, rational theology, and rational psychology are heavily criticized by Kant in the Dialectics, Kant's metaphysics of nature seems to be restricted to (1) transcendental philosophy (or ontology in the Kantian sense) and (2) "the metaphysics of corporeal nature" (or rational physics).[21]

19 For a detailed discussion of this "building plan" of Kant's new metaphysics, see De Boer (2020, pp. 216–222).

20 See Friedman (2013, p. xiii); De Boer (2020, pp. 230–231).

21 Kant's criticism of rational theology, rational cosmology, and rational psychology in the Dialectics does not necessarily entail that no positive use for cognition can be extracted from them. Commentators have recently drawn on Kant's notion of the regulative use of reason to suggest that Kant makes room for a positive use of the ideas of reason in psychology (Kraus 2018), cosmology (Ho-

The metaphysics of corporeal nature is precisely the discipline treated in isolation in the *Metaphysical Foundations of Natural Science* to provide transcendental philosophy with concrete instantiations. Much has been discussed on whether these concrete instantiations are essential for the argument carried out in the first *Critique.*[22] I will leave this discussion aside to focus on the other side of the problem, namely, on how the metaphysics of corporeal nature should provide natural sciences with principles or foundations. This thesis might appear puzzling at first sight. Whereas the B Preface presents mathematics and natural science as models of cognition that metaphysics should follow to become a science, the *Metaphysical Foundations* states that "properly so-called natural science presupposes, in the first place, metaphysics of nature" (AA 04: 469). Why does Kant think that natural science *presupposes metaphysics?*

In Kant's view, "a rational doctrine of nature [...] deserves the name of a natural science, only in case the fundamental natural laws therein are cognized *a priori*", so that "natural science must derive the legitimacy of this title only from its *pure part*" (AA 04: 469, my emphasis). Now, according to Kant, "to cognize something *a priori* means to cognize it from its mere possibility" (AA 04: 470). Therefore, the pure part of a natural science is the one that accounts for its *possibility.* Kant recognizes two kinds of pure rational cognition: *mathematics and metaphysics.*

Concerning metaphysics specifically, Kant claims that "properly so-called natural science presupposes, in the first place, metaphysics of nature" (AA 04: 469). This is the case because natural science presupposes both the possibility of "the concept of nature in general" (AA 04: 469) and the possibility of the object to which such a science applies, that is, a "particular nature of this or that kind" (AA 04: 470). The possibility of nature in general is established by "the transcendental part of the metaphysics of nature" (AA 04: 470), whereas the possibility of the object to which a particular science applies should be established by a second part of the metaphysics of nature, which is irreducible to transcendental philosophy.

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ward 2023), and theology (Spagnesi 2022). I will leave aside this discussion of the regulative use of reason, as this chapter focuses rather on rational physics in which Kant sees the use of reason as constitutive.

22 Authors who defend this view claim either that the *Metaphysical Foundations* is a further application of the Analytic of Principles (Westphal 1995, p. 44; Lyre 2006, p. 415) or that the book completes the Schematism by engaging with the particularities of objects of outer sense (Ellington 1970, p. 198; Förster 1987, p. 542). I argued elsewhere that this latter reading is important for Schelling, who takes the *Metaphysical Foundations* to be a necessary step to complete Kant's argument in the Schematism chapter (Garcia 2024). I shall leave this discussion aside here as my argument is focused rather on the relationship between Kant's metaphysics of nature and science.

This subdivision seems to map well onto Kant's distinction between transcendental philosophy and physiology of pure reason in the Architectonic chapter, where the former is an analogue of general metaphysics and the latter an analogue of applied metaphysics. As for the specific part of applied metaphysics presupposed by natural science, Kant describes it as a discipline concerned:

> with a particular nature of this or that kind of thing, for which an empirical concept is given, but still in such a manner that, outside of what lies in this concept, no other empirical principle is used for its cognition (for example, it takes the empirical concept of matter or of a thinking being as its basis, and it seeks that sphere of cognition of which reason is capable *a priori* concerning these objects), and here such a science must still always be called a metaphysics of nature, namely, of corporeal or of thinking nature. However, it is then not a general, but a special metaphysical natural science (physics or psychology), in which the above transcendental principles are applied to the two species of objects of our senses. (AA 04: 470)

The metaphysics of nature should therefore assure that the principles accounting for the possibility of nature in general are also applicable to a special kind of object. Given that science necessarily applies to objects of experience, the special kind of object to which Kant refers consists in "the two species of objects of our senses", namely, *corporeal nature* and *thinking nature.* Since, for reasons that I shall not consider here, Kant refrains from attributing the status of proper science to the doctrine of thinking being, the applied part of his metaphysics of nature focuses on *corporeal nature.*

So, when Kant addresses the metaphysical part presupposed by science, I take him to refer to the conditions of possibility of nature in general and of corporeal nature in particular. The possibility of nature in general should be established by transcendental philosophy whereas the possibility of corporeal nature is to be grounded by the metaphysics of corporeal nature that is delivered by the *Metaphysical Foundations of Natural Science.* In this sense, I disagree with commentators who claim that Kant's *Metaphysical Foundations* merely aims at providing a regulative model for science,[23] and I side rather with those who argue that Kant elaborates an argument to establish "the conditions of possibility" of the objects of science.[24]

Kant's metaphysics of corporeal nature is thus, on the one hand, an *application* of transcendental philosophy and, on the other hand, an attempt at *grounding*

23 Buchdahl 1986, p. 157.

24 Watkins 1998, p. 577. Accordingly, I concur with Pollok's verdict that "Kant's theory of matter should be interpreted as constitutive" and not merely regulative (Pollok 2011, p. 71n).

the possibility of natural science.[25] But why does Kant think that the possibility of natural science should be grounded in the first place? And how does this relate to the emergence of modern science? I shall address these questions in the next section.

3 Kant and the Mathematization of Nature

'Modern science' is a phrase employed to describe the scientific praxis emerging from "the conceptual, methodological, and institutional"[26] transformations brought about by the so-called Scientific Revolution. In broad lines, these transformations consist in the rise of mechanical philosophy, the elaboration of the empirical method, the integration of mathematics and science, and the development of new technologies required by the expansion of "trade and navigation".[27] In the wake of these innovations, different scientific disciplines have emerged and consolidated their autonomy. Such a reshaping of the cartography of knowledge posed several conceptual challenges. For Kant, particularly the integration of mathematics and science required philosophical explanation.

It is Newton's 1687 *Mathematical Principles of Natural Philosophy* that "proclaimed the complete integration of mathematics and natural philosophy",[28] thereby crowning earlier efforts by Galileo, Kepler, Huygens, and others to bring science and mathematics together. This integration, also depicted as the mathematization of nature, has often been described as the key element in the emergence of mod-

25 Sturm argues that "perhaps it is not even correct to translate the German term *Anfangsgründe* by 'Foundations' in the first place: Kant presents principles from which research can begin, not a set of basic, intuitively known axioms from which one could already derive, by means of demonstration, all the knowledge contained in the relevant science. He does not follow an overly demanding form of rationalism, like that derived from the Aristotelian definition of *episteme.* Instead, he is trying to show the conditions under which quantitative empirical research of matter in motion is possible" (Sturm 2022, p. 32). While I do not disagree that Kant's *Metaphysical Foundations* should not be read in the strong sense of a ground from which to deduce scientific knowledge, I do not take this to invalidate the point that Kant attempts to establish the conditions of possibility of science, that is, to provide science with the grounds, or the conceptual framework, based on which it is possible.

26 Henry 1997, p. 1.

27 All four factors are extracted by Marcus Hellyer from canonical attempts at determining the main features of what has been called "the Scientific Revolution"; depending on the interpretation of the period, more emphasis is placed on one or other aspect (Hellyer 2003, pp. 5–7).

28 Hellyer 2003, p. 7.

ern science.[29] I consider Kant to adhere to this integration with an important caveat. If by natural philosophy it is meant *natural science*, then Kant endorses Newton's attempt to provide science with mathematical principles. However, if by natural philosophy it is meant philosophy or metaphysics of nature, then Kant seems to hold a different view. For he states that even those "who have wished to proceed mathematically in their occupation have always, and must have always, made use of metaphysical principles (albeit unconsciously), even if they themselves solemnly guarded against all claims of metaphysics upon their science" (AA 04: 472). Kant indicates here that in contrast to Newton's attempt at providing natural philosophy with *mathematical principles*, he seeks rather to provide the mathematical cognition of nature with *metaphysical principles.*[30] Thus, in contrast to the *Mathematical Principles of Natural Philosophy,* Kant writes the *Metaphysical Foundations of Natural Science.*

For Kant, however, mathematics remains key to the possibility of natural science. The preface to the *Metaphysical Foundations* states unambiguously that "in any special doctrine of nature there can be only as much proper science as there is mathematics therein" (AA 04: 470). In Kant's view, mathematics is required to explain the possibility of natural science insofar as "the possibility of determinate natural things cannot be cognized from their mere concepts" (AA 04: 470); such a cognition must thus be constructed in *a priori* intuition. Since, for reasons that I will leave aside here, Kant considers mathematics as the only rational cognition capable of constructing concepts in *a priori* intuitions, mathematics is indispensable for natural science. The possibility it accounts for is the possibility of rational cognition of *determinate* objects. Thus, "a pure doctrine of nature concerning *determinate natural things* [...] is only possible by means of mathematics" (AA 04: 470, my emphasis).

In my view, when Kant's descriptions of the roles of mathematics and metaphysics in natural science are brought together, it becomes clearer the specific way in which he takes natural science to presuppose both disciplines. The *pure part* of natural science should account for *the possibility* of nature in general, cor-

29 Floris Cohen traces a helpful history of the phrase 'mathematization of nature' in the historiography of science; in his view, even if "the historical formula 'Scientific Revolution = mathematization of nature' came to look [...] quite untenable", the "the mathematization of nature remains one vital constituent of the entire process of the Scientific Revolution" (Floris Cohen 2010, pp. 156, 159).

30 This point is made by Pollok who claims that Kant is alluding to Newton's *Principia* in this passage. Pollok argues that in Kant's view "setzt [...] *die* Naturphilosophie als mathematische Wissenschaft *die* metaphysische Naturwissenschaft – und damit Kants MAdN – voraus" (Pollok 2001, p. 115).

poreal nature, and determinate natural things. The task of explaining the first two belongs to metaphysics, whereas the task of establishing the latter belongs to mathematics. Moreover, a mathematical doctrine of nature presupposes metaphysics, in that the cognition of determinate natural things presupposes both the possibility of *nature in general* and the possibility of *corporeal nature in particular*. Yet metaphysics is not enough for establishing the possibility of natural science, since the latter requires the *a priori* cognition of determinate objects, which is only possible through mathematics.

According to this picture, mathematics is indispensable for science insofar as it grounds the possibility of cognizing *a priori* determinate objects. Metaphysics is likewise indispensable to the extent that the possibility of nature in general and corporeal nature in particular is presupposed by the mathematical cognition of nature. It follows that the task of metaphysics is to conceive of these presupposed concepts in such a way as to make them consistent with the applicability of mathematics to determinate objects. Thus, the aim of Kant's metaphysics of corporeal nature is to ground the applicability of mathematics to the doctrine of determinate material objects.

Kant explains the way in which he seeks to achieve this aim as follows:

> [I]n order to make possible the application of mathematics to the doctrine of body, which only through this can become natural science, principles for the construction of the concepts that belong to the possibility of matter in general must be introduced first. Therefore, a complete analysis of the concept of a matter in general will have to be taken as the basis, and this is a task for pure philosophy – which, for this purpose, makes use of no particular experiences [...] and is therefore a genuine metaphysics of corporeal nature. (AA 04: 472)

Thus, Kant seeks to establish the metaphysical principles for the possibility of a concept of matter that could be treated mathematically. I suggest accordingly that Kant's *Metaphysical Foundations* consists in Kant's response to the following philosophical challenge: what concept of matter is required to ground the applicability of mathematics to corporeal nature? Since, for Kant, there can only be science of corporeal nature, Kant's main aim is to establish a concept of matter suitable for explaining the possibility of science, where science is understood as a mathematical doctrine of nature. I consider as further confirmation of this reading the fact that Kant describes the Phoronomy, the first chapter of his *Metaphysical Foundations* that lays the grounds for the subsequent chapters of the book, as a "mathesis of motion" (AA 04: 489).

Since the mathematization of nature is a distinctive feature of the emergence of modern science, I agree with Friedman's overall assessment that Kant's philosophical endeavor should be read in the broader context of "the struggle to adjust our conceptions of both nature and humanity to the profound intellectual and spi-

ritual upheavals of the scientific revolution and its aftermath" (Friedman 2013, x). In my view, the concept of matter elaborated by Kant in the *Metaphysical Foundations* is a key element of such an attempt at adjustment. As I shall argue in the next section, I believe Schelling's philosophy of nature should be read in light of this same struggle for adjustment.

4 From Kant's Metaphysics of Nature to Schelling's Philosophy of Nature

The importance of empirical scientific debates for Schelling's early philosophy of nature can hardly be overstated. Schelling devotes about the half of his *Ideas for a Philosophy of Nature* to dissecting the recent innovations in chemistry and related fields. His subsequent works, the 1798 *On the World Soul* and the 1799 *First Outline of a System of Natural Philosophy*, consist almost exclusively of discussions of newly formulated scientific theories concerning inorganic and organic nature. Like Kant, Schelling is attentive to the development of modern natural sciences. In contrast to Kant, however, his metaphysics of nature mostly engages with the challenges posed by emerging scientific fields, such as chemistry, natural history, the physics of electric and magnetic phenomena, and life sciences. Accordingly, he engages with a wide range of contemporary scientists working in these fields: Lavoisier, Priestley, Buffon, Pierre Prévost, Benjamin Franklin, among others. As Manfred Durner puts it, Schelling's project of a philosophy of nature "was shaped from the beginning by its engagement with the empirical natural sciences and would not have been possible without it" (Durner 1991, p. 103).[31]

This is particularly visible in Schelling's first book on natural philosophy, the 1797 *Ideas for a Philosophy of Nature.* Schelling's *Ideas* consists of two parts: the first presents the state of the art of the empirical science of the time whereas the second carries out a philosophical discussion of the results extracted from the empirical part. In the philosophical part, Schelling systematically engages with Kant's dynamical concept of matter, elaborated in the *Metaphysical Foundations.* In this section, I shall argue that Kant's *Metaphysical Foundations* and Schelling's *Ideas* share the same overall goal, namely, establishing a concept of matter

31 The importance of the empirical scientific debates of the time for understanding Schelling's natural philosophy is so significant that the Bavarian Academy of Science included a supplement volume to Schelling's complete works devoted to the state of the art of the science of the time (HKA I/5 – 9).

suitable for the emerging modern natural sciences. The next section will discuss the particularity of Schelling's strategy in relation to Kant's.

In the preface to the *Ideas*, Schelling addresses what he calls the "pure result of the previous philosophical investigations of our time" (HKA I/5, p. 61). Whereas he does not explicitly mention Kant or any other philosopher in the preface, he echoes Kant's notion of an application of transcendental philosophy. In Schelling's words:

> The pure theoretical philosophy concerns itself only with the investigation into the reality of our knowledge *as such*; it belongs, however, to the *applied*, under the name of a Philosophy of Nature, to derive from principles a *determinate* system of our knowledge (that is, the system of experience as a whole). (HKA I/5, p. 61; 1988, p. 3)

Schelling thus suggests that his philosophy of nature is an *application* of "pure theoretical philosophy", which is concerned with "the reality of our knowledge as such". Given that he describes such an investigation of knowledge as the one responsible for formulating "the general principles of possible experience" (HKA I/5, p. 61; 1988, p. 3), it seems to be clear that he is referring to the principles treated by transcendental philosophy. The suggestion that the philosophy of nature is an *application* of pure theoretical philosophy echoes Kant's contrast between general metaphysics (transcendental philosophy) and the metaphysics of corporeal nature (rational physics). I take this to already situate Schelling's *Ideas* in a similar conceptual space as Kant's *Metaphysical Foundations*.

Additionally, Schelling's *Ideas* also plays a foundational role in relation to natural science. In the empirical part of the book, Schelling seeks to conceive of the phenomena explored by the sciences of his time as different manifestations of the forces of attraction and repulsion. He considers these forces to be essential for explaining phenomena such as combustion (HKA I/5, p. 112), heat (HKA I/5, p. 119), the formation of mountains and of the planetary system (HKA I/5, pp. 132–133)[32], electricity (HKA I/5, pp. 144–145), as well as, in general, what he calls chemical processes (HKA I/5, pp. 176–177), that is, processes through which matter undergoes transformation. In this context, he claims that "nature is able to achieve the entire manifold of her phenomena, on the small scale as well as on the large, by means of opposing forces of attraction and repulsion" (HKA I/5, p. 179; 1988, p. 135). Accordingly, the philosophical part of the *Ideas* starts as follows:

32 To substantiate this thesis, Schelling explicitly draws on Kant's "On the Volcanoes on the Moon", a short essay published in the *Berlinische Monatschrift* in 1785 (see AA 08, 67–76).

> We assume, for the time being, that the laws of reciprocal attraction and repulsion are universal laws of nature and ask what would necessarily have to follow from this assumption. If both are universal laws of nature, they have to be *conditions for the possibility of a nature as such.* But we begin by considering them only in regard to matter, insofar as it is an object of our knowledge in general, and apart from any specific or qualitative diversity it may possess. So these laws must first be considered as *conditions for the possibility of matter as such*, and there must be no matter originally conceivable, without there being attraction and repulsion between it and some other. (HKA I/5, pp. 183–184; 1988, p. 143, my emphasis)

Schelling thus suggests that the aim of the philosophical part of his book is to ground the hypothesis that the laws of attraction and repulsion are the conditions for the possibility of *nature as such* and of *matter as such.* This corresponds precisely to the objects Kant attributes to his metaphysics of nature, which includes transcendental philosophy and the metaphysics of corporeal nature. I thus consider Schelling's initial description of the philosophical part of his *Ideas* to roughly correspond to what Kant calls the metaphysical part of natural science, namely, the one responsible for establishing the possibility of nature in general and corporeal nature in particular.

Moreover, Schelling indicates that he will restrict his investigation by considering these laws "only in regard to matter". I take the overall structure of the philosophical part of Schelling's *Ideas* to confirm this focus. Chapters 1–3 address the different philosophical uses of the principles of attraction and repulsion, chapters 4–6 focus on establishing a concept of matter suitable to explain the different manifestations of the principles of attraction and repulsion, and chapters 7–9 are devoted to applying the results of the philosophical part to science. Therefore, the philosophical part of Schelling's *Ideas* seems to focus on a similar problem as Kant's metaphysics of corporeal nature, namely, elaborating a concept of matter suitable to explain the phenomena treated by the sciences of the time.

Like Kant's metaphysics of corporeal nature, Schelling's *Ideas* thus occupies a space between pure theoretical philosophy and science. As regards pure theoretical philosophy, it is an application of general theoretical philosophy to a special kind of object, thereby providing philosophy with concrete instantiations. As regards science, it seeks to ground the possibility of the sciences of the time. Furthermore, it plays the role of an intermediary between philosophy and science by working out the concept of matter that should be presupposed by the sciences of the time if corporeal nature is to be compatible with the scientific cognition of determinate phenomena.

5 Schelling and the Transformable Character of Nature

I have argued so far that Kant and Schelling elaborate a domain of investigation between philosophy and science called metaphysics of nature and that such an endeavor should be read in light of the struggle to adapt the conception of material nature to the scientific transformations of the time. I claimed that Kant's metaphysics of nature is specifically aimed at grounding the mathematization of nature entailed by the emergence of modern science. In this section, I shall suggest that Schelling elaborates a different model for conceiving of such a metaphysics by focusing on a different trait of modern science, namely, its conception of nature as something transformable.

As seen, Kant furnishes from the outset a criterion that any doctrine of nature must meet to be considered proper science, namely, the ability to construct the concepts of its objects *a priori* in intuition, which in Kant's view can only happen by means of mathematics. Accordingly, Kant's *Metaphysical Foundations* aims to conceive of corporeal nature in a way that is compatible with the application of mathematics thereto. Schelling's *Ideas*, by contrast, does not furnish any criterion for scientificity from the outset. On the contrary, Schelling begins his book with the empirical part, in which he discusses the state of the art of the scientific research of the time. Schelling explains this procedure as follows:

> I considered it necessary to begin with the first [L.G.: the empirical part], because what follows in the text very often takes into account the more recent discoveries and investigations in physics and chemistry. But this created the inconvenience that much had to remain in doubt which I believed myself able to decide, on philosophical principles, only at a later stage. (HKA I/5, p. 62; 1988, p. 4, translation modified)

Thus, instead of announcing a normative criterion for science, Schelling carries out an investigation of the "more recent discoveries" in natural science. Whether these discoveries can be grounded in philosophical principles is something that remains to be decided at a later stage, in the second part of the book. The text thus "does not begin *from above* (with the establishment of the principles), but *from below* (with experimental findings and the testing of the previous systems)" (HKA I/5, p. 107; 1988, p. 42).

Schelling's approach thus seems to imply a different relationship between philosophy and science than the one depicted by Kant's *Metaphysical Foundations*, according to which philosophers need not engage with recent scientific discoveries before formulating philosophical principles. From a historical perspective, however, it might be argued that Kant has formulated a philosophical response to the

emergence of the modern scientific method. As Michael Friedman puts it in his canonical commentary of the *Metaphysical Foundations*, Kant "aims to use all the resources of his revolutionary metaphysics" to "explain how the modern mathematization of nature [...] first becomes possible" (Friedman 2013, pp. 32–33). Kant's attempt at grounding the applicability of mathematics to corporeal nature is thus arguably a philosophical justification of the scientific developments of his time. The differences between both approaches might then be explained away if one considers that Schelling delivers a book that follows the order of discovery, from the empirical manifestations to philosophical principles, whereas Kant's book follows the order of reasons, from the principles to the determinate phenomena treated by science. According to this picture, Kant would have recognized that the scientific developments of his time called for a new conception of matter, which he delivered in the order of reasons. Schelling, by contrast, would, at least in 1797, still be exploring the scientific field of his time according to the order of discovery. This would explain the incipient character of his book, which, as he warns the reader in the preface, "contains no scientific system, but only *ideas* for a philosophy of nature" (HKA I/5, p. 61; 1988, p. 4).

Additionally, Kant's *Metaphysical Foundations* engages with the principles of Newtonian physics formulated about 100 years before. When Kant intervenes in the discussion, the principles of Newtonian physics were a consolidated topic of discussion among educated audiences. Schelling, by contrast, engages with the work of contemporary scientists, some of whom were still alive and active at the time. He thus looks for a concept of matter compatible with the "more recent discoveries [...] in physics and chemistry". By the phrase 'more recent discoveries', Schelling refers to "investigations concerning heat, light, electricity, and the like" (HKA I/5, p. 61; 1988, p. 4). He is particularly interested in recent scientific novelties such as Lavoisier's discovery of oxygen, since he takes the affinity or non-affinity of this element with other elements (or, as Schelling would put it, this element's attraction or repulsion toward other elements) to enable the explanation of phenomena as diverse as combustion, electrical discharges, and heat.

Schelling's interest in Lavoisier's discovery is no coincidence. Despite his apparently unsystematic procedure, the structure of the *Ideas* indicates that he focuses on scientific novelties in the field of chemistry.[33] Accordingly, three of the five chapters of the empirical part are on chemistry (the other two are on electricity and magnetism) and the three last chapters of the philosophical part are titled: "Philosophy of Chemistry", "Application of these Principles to the particular Ob-

33 As Manfred Durner has shown (1990; 1991), Schelling was following several classes on these topics both in Tübingen and Leipzig from 1796 to 1798.

jects of Chemistry", and "Essay on the Principles of Chemistry". This suggests that Schelling's interpretation of the "more recent discoveries" leads him to attempt the formulation of a concept of matter suitable for explaining chemical phenomena.

But why should a sketch of ideas for a philosophy of nature focus on chemistry? What is the philosophical point behind it? In my view, Schelling explains this point in the short introduction to the empirical part of his book. In this context, he claims to be particularly interested in how the human being:

> operates upon nature, determines her according to purpose and intention, lets her act before his eyes, and as it were spies on her at work. But that the exercise of this dominion is possible, he owes yet again to nature, whom he would strive in vain to dominate, if he could not put her in conflict with herself and set her own forces in motion against her [...]. We shall therefore begin our discussion of nature most fruitfully with the primary natural process by which bodies are destroyed and dissolved. (HKA I/5, p. 111; 1988, p. 58)

Schelling thus aims at grasping the conditions under which the human being "operates upon nature". In his view, these human interventions into nature are possible "due to nature", that is, due to the forces of nature that humans can "set in motion" to generate the desired results. Accordingly, he begins the empirical part of his book with a chapter on combustion, "the primary natural process by which bodies are destroyed and dissolved".

In this first chapter, Schelling extensively discusses the role of the recently discovered element oxygen in the explanation of combustion. I take it to be remarkable that Schelling begins his *Ideas* by discussing the oxygen theory of combustion, which has since been described as key to the so-called Chemical Revolution.[34] While the concept of Chemical Revolution was coined much later than 1797, Schelling sensed the significance of the recent developments when he states that the "discoveries of the new chemistry might in the end afford the essentials of a new system of nature" (HKA I/5, p. 116; 1988, p. 62). In Schelling's view, chemistry is the empirical science that "tells us how a free play of dynamical forces may be possible, in that nature engenders new combinations and again abolishes those she has brought about" (HKA I/5, p. 237; 1988, p. 206). Chemistry thus considers the ways in which corporeal nature *changes* with or without human intervention, or, as Schelling succinctly puts it, it "considers matter in its becoming" (HKA I/5, p. 253; 1988, p. 222).

Schelling's engagement with the recent scientific discoveries of his time thus seems to lead him to the conclusion that matter should be conceived of as something that *can undergo processes of transformation*, be it in a natural way or

34 Kuhn 2012, p. 70.

through human intervention. He takes chemistry to be the doctrine that aims at explaining these transformations. On my account, the main philosophical question he addresses to these recent developments shows the similarity and the difference between his *Ideas* and Kant's *Metaphysical Foundations*. Like Kant, Schelling seeks to establish the concept of matter required to explain the kind of cognition expressed by the sciences of the time. Unlike Kant, however, this concept of matter should ground not the applicability of mathematics to corporeal nature, but the fact that corporeal nature *can undergo processes of transformation*. In my view, the second part of Schelling's *Ideas* aims at elaborating such a concept of matter.

I will leave aside here the details of Schelling's elaboration of such a concept as it would lead me away from the purpose of this chapter. My main point is that Schelling's philosophical engagement with the more recent scientific discoveries of his time raises a different question than the one raised by Kant's *Metaphysical Foundations*, as Schelling focuses less on the mathematization of nature and more on the transformable character thereof. If a Newtonian physics is at the core of the former, Schelling seems to imply that chemistry is key to the latter. I thus take Kant and Schelling to address from a philosophical standpoint two of the most important assumptions of modern science: the mathematization of nature and the transformable character of nature.

6 Concluding Remarks

In this chapter, I drew on Di Giovanni's claim that the first formulation of Schelling's natural philosophy in the 1797 *Ideas for a Philosophy of Nature* is better understood in light of the transition challenge faced by Kant's philosophy. In contrast to Di Giovanni, I argued that this challenge reflects the broader issue of reassessing the role of philosophy in the context of the rapid development of modern science. Accordingly, I claimed that Kant and Schelling work out a domain of investigation between philosophy and science that focuses on the concept of matter: the metaphysics or philosophy of nature. I suggested that while Kant's model for such a metaphysics places emphasis on the challenges posed by the mathematization of nature, Schelling's model is rather focused on issues related to the transformable character of nature. In my view, this approach has the advantage of placing the philosophy of nature developed in Germany at the turn of the nineteenth century in the broader context of the philosophical challenges posed by the rise of modern science.[35]

35 This chapter is part of the project "Schelling's Philosophy of Nature and the Environmental

Abbreviations

AA = Kant, Immanuel (1900–): *Gesammelte Schriften.* Berlin-Brandenburgische (formerly Königlich-Preußische) Akademie der Wissenschaften (Ed.). Berlin: Reimer, De Gruyter. [The *Critique of Pure Reason* is cited according to the standard A / B pagination.]

HKA = Schelling, Friedrich Wilhelm Joseph (1976–): *Historisch-kritische Ausgabe.* Bayerische Akademie der Wissenschaften (Ed.). Stuttgart: Frommann-Holzboog.

Translations

Kant, Immanuel (1998): *Critique of Pure Reason.* Translated by P. Guyer and A. Wood. Cambridge: Cambridge University Press.

Kant, Immanuel (2004): *Metaphysical Foundations of Natural Science.* Translated by M. Friedman. Cambridge: Cambridge University Press.

Schelling, Friedrich Wilhelm Joseph (1988): *Ideas for a Philosophy of Nature.* Translated by E. Harris and P. Heath. Cambridge: Cambridge University Press.

Bibliography

Allison, Henry (1994): "Causality and Causal Law in Kant: A Critique of Michael Friedman". In: P. Parrini (Ed.): *Kant and Contemporary Epistemology.* Dordrecht: Kluwer, pp. 291 – 307.

Beiser, Frederick (2006): "Kant and Naturphilosophie". In: M. Friedman/A. Nordmann (Eds.): *The Kantian Legacy in Nineteenth-Century Science.* Cambridge, MA: MIT Press, pp. 7 – 26.

Bonsiepen, Wolfgang (1997): *Die Begründung einer Naturphilosophie bei Kant, Schelling, Fries und Hegel.* Frankfurt am Main: Klostermann.

Buchdahl, Gerd (1969): *Metaphysics and the Philosophy of Science.* Oxford: Basil Blackwell.

Buchdahl, Gerd (1986): "Kant's 'Special Metaphysics' and the Metaphysical Foundations of Natural Science". In: R. Butts (Ed.): *Kant's Philosophy of Physical Science.* Dordrecht: D. Reidel, pp. 127 – 161.

De Boer, Karin (2020): *Kant's Reform of Metaphysics. The Critique of Pure Reason Reconsidered.* Cambridge: Cambridge University Press.

Di Giovanni, George (1979): "Kant's Metaphysics of Nature and Schelling's Ideas for a Philosophy of Nature". In: *Journal of the History of Philosophy* 17, no. 2, pp. 197 – 215.

Durner, Manfred (1990): "Schellings Begegnung mit den Naturwissenschaften in Leipzig". In: *Archiv für Geschichte der Philosophie* 72, no. 2, pp. 220 – 236.

Durner, Manfred (1991): "Die Naturphilosophie im 18. Jahrhundert und der naturwissenschaftliche Unterricht in Tübingen. Zu den Quellen von Schellings Naturphilosophie". In: *Archiv für Geschichte der Philosophie* 73, pp. 72 – 103.

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Ellington, James W. (1970): "The Unity of Kant's Philosophy of Nature". In: *Immanuel Kant, Metaphysical Foundations of Natural Science. Translation with Introduction and Essay.* Indianapolis: Bobbs-Merrill, pp. 137 – 218.

Falkenburg, Brigitte (1987): *Die Form der Materie. Zur Metaphysik der Natur bei Kant und Hegel.* Frankfurt am Main: Athenäum.

Floris Cohen, Hendrik (2010): "The 'Mathematization of Nature': The Making of a Concept, and How It Has Fared in Later Years". In: V.R. Remmert/M.R. Schneider/H.K. Sørensen (Eds.): *Historiography of Mathematics in the 19th and 20th Centuries.* Cham, Switzerland: Birkhäuser, pp. 143 – 160.

Förster, Eckart (1987): "Is There 'A Gap' in Kant's Critical System?". In: *Journal of the History of Philosophy* 25, no. 4, pp. 533 – 555.

Förster, Eckart (2018): *Die* 25 *Jahre der Philosophie. Eine systematische Rekonstruktion* – 3., verbesserter Auflage. Frankfurt am Main: Klostermann.

Friedman, Michael (1986): "The Metaphysical Foundations of Newtonian Science". In: R. Butts (Ed.): *Kant's Philosophy of Physical Science.* Dordrecht: D. Reidel, pp. 25 – 60.

Friedman, Michael (2013): *Kant's Construction of Nature: A Reading of the Metaphysical Foundation of Natural Science.* Cambridge: Cambridge University Press.

Garcia, Luis Fellipe (2024): The Importance of Kant's Schematism for Schelling's Project of a Philosophy of Nature. In: *Archiv für Geschichte der Philosophie* 106, no. 1, pp. 79 – 105.

Hellyer, Marcus (2003): "Editor's Introduction: What was the Scientific Revolution". In: M. Hellyer (Ed.): *The Scientific Revolution: The Essential Readings.* Oxford: Blackwell, pp. 1 – 15.

Henry, John (1997): *The Scientific Revolution and the Origins of Modern Science.* London: Macmillan.

Howard, Stephen (forthcoming): "The cosmological ideas in Kant's critical philosophy: Their unique status and twofold regulative use". In: *The Southern Journal of Philosophy* (ahead of print: https://onlinelibrary.wiley.com/doi/full/10.1111/sjp.12529).

Kraus, Katharina (2018): "The Soul as the 'Guiding Idea' of Psychology: Kant on Scientific Psychology, Systematicity, and the Idea of the Soul". In: *Studies in History and Philosophy of Science* 71, pp. 77 – 88.

Kuhn, Thomas (2012): *The Structure of Scientific Revolutions*, 50th anniversary ed. Chicago, London: University of Chicago Press.

Lyre, Holger (2006): "Kants 'Metaphysische Anfangsgründe der Naturwissenschaft' gestern und heute". In: *Deutsche Zeitschrift für Philosophie* 54, no. 3, pp. 401 – 416.

Pollok, Konstantin (2001): *Kants Metaphysische Anfangsgründe der Naturwissenschaft: Ein kritischer Kommentar.* Hamburg: Meiner.

Schmid, Jelscha (2022): *The Methods of Metaphilosophy. Kant, Maimon, and Schelling on How to Philosophize about Philosophy.* Frankfurt am Main: Klostermann.

Schmied-Kowarzik, Wolfdietrich (1996): *Von der wirklichen, von der Seyenden Natur.* Stuttgart: Frommann-Holzboog.

Schnöneker, Dieter, Schulting, Dennis, and Stroback, Niki (2011): "Kants kopernikanisch-newtonische Analogie". In: *Deutsche Zeitschrift für Philosophie* 59, no. 4, pp. 497 – 518.

Spagnesi, Lorenzo (2022): "The Idea of God and the Empirical Investigation of Nature in Kant's *Critique of Pure Reason*". In: *Kantian Review* 27, no. 2, pp. 279 – 297.

Sturm, Thomas (2022): "Kant's Conception of the Metaphysical Foundations of Natural Science: Subject Matter, Method, and Aim". In: M. Bennett McNulty (Ed.): *Kant's Metaphysical Foundations of Natural Science: A Critical Guide.* Cambridge: Cambridge University Press, pp. 13 – 35.

Thomson, Terrence (2022): "Kant's Opus postumum and Schelling's Naturphilosophie: The Very Idea". In: *Ephoché: A Journal for the History of Philosophy* 27, no. 1, pp. 97 – 117.

Watkins, Eric (1998): "The Argumentative Structure of Kant's Metaphysical Foundations of Natural Science". In: *Journal of the History of Philosophy* 36, no. 4, pp. 567 – 593.

Westphal, Kenneth (1995): "Does Kant's *Metaphysical Foundations of Natural Science* Fill a Gap in the *Critique of Pure Reason*?". In: *Synthese* 103, no. 1, pp. 43 – 86.

Wild, Christoph (1968): *Reflexion und Erfahrung: Eine Interpretation der Früh- und Spätphilosophie Schellings.* Freiburg, München: Alber.