

# **Kant and the transformation of natural history**

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It is clear that the cognition of natural things as they *are now* always leaves us desirous of the cognition of that which they once *were* and of the series of changes they underwent to arrive at each place in their present state. *Natural history*, which we still lack almost entirely, would teach us about the changes in the shape of the earth, likewise that of its creatures (plants and animals) that they have undergone through natural migrations and the resultant degeneration from the archetype of the stem species. It would presumably trace a great many of seemingly different kinds to races of the same species and would transform the sprawling school system of natural description into a physical system of the understanding.

Immanuel Kant (DR77 2:434n)

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## *Acknowledgements*

This book draws attention to an overlooked transformation in eighteenth century philosophy whereby natural history ceased to be understood as the logical practice of classification and was reconceived as a causal explanation of the diversity of natural things. This transformation was enabled by a deep epistemological and metaphysical shift in which *time* became the methodological frame in which explanations are required, sought after, and justified in natural history. These shifts were catalysed by the collision of European knowledge with recalcitrant phenomena encountered through growing trade routes and the ever-expanding colonial frontier, which opened new possibilities for collection, description, and research. The collision of known and unknown occasioned profound philosophical reflections on the capacity of thought to fall into illusions of its own devising, and the progress that might be made through a new method sensitive to phenomena in their stunning uniqueness. Yet it was also occasioned by and deployed in the service of colonial power. The tension between self-knowledge and delusion lies at the heart of this study. One of my aims is elucidate the ways in which natural history's transformation both challenged and reinforced the prejudice of European superiority. There is still much work to be done to deconstruct the constellations of power entangled within the European Enlightenment, especially in the work of its canonical figures. This book is a modest attempt to further the task in the scholarship concerning one philosopher whose life was thoroughly enmeshed in the broader tensions concerning confronting natural historians in the eighteenth century: Immanuel Kant.

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## *Note on citations*

Citations of Kant's works refer to the volume and page number of *Kants gesammelte Schriften*, edited by the Königlich Preußischen Akademie der Wissenschaften, later the Deutschen Akademie der Wissenschaften zu Berlin (Walter de Gruyter (and predecessors), 1902-). For citations of *Critique of Pure Reason*, I use the customary A/B page numbers from the first and second editions. Where available, I have used translations from the Cambridge University Press editions, which are cited in text. Modifications are noted in footnotes, except for the following: *Kraft* is translated consistently as *force*; *Zweck* as *purpose*; the German classificatory terms *Gattung*, *Art* and *Stamm* as *species*, *kind* and *stem*. In other cases, translations are my own. Abbreviations for Kant's texts are listed below.

Citations to other texts are by page number, except in cases where the cited paragraph or chapter would be more useful. Unless otherwise noted, translations of non-English texts are my own.

### *Works published during Kant's lifetime*

- TE*      *Thoughts on the True Estimation of Living Forces*. In *Natural Science*. Edited by Eric Watkins. Translated by Jeffrey Edwards and Martin Schönfeld. Cambridge: Cambridge University Press, 1-155, 2012.
- UNH*    *Universal Natural History and Theory of the Heavens*. In *Natural Science*. E. Watkins (ed.), Cambridge: Cambridge University Press, 182-308, 2012.
- NE*      *A New Elucidation of the First Principles of Metaphysical Cognition*. In *Theoretical Philosophy, 1755-1770*. Translated and Edited by David Walford. Cambridge: Cambridge University Press, 1-46, 1992.
- OBS*    *Observations on the Feeling of the Beautiful and the Sublime*. In *Anthropology, History, and Education*, G. Zöllner and R. Loudon (eds.), Cambridge: Cambridge University Press, 18-62, 2007.
- OPA*    *The Only Possible Argument in Support of a Demonstration of the Existence of God*. In Kant, Immanuel. In *Theoretical Philosophy, 1755-1770*. Translated and Edited by David Walford. Cambridge: Cambridge University Press, 107-201, 1992.
- D*        *Dreams of a Spirit Seer Elucidated by Dreams of Metaphysics*. In *Theoretical Philosophy, 1755-1770*. Translated and Edited by David Walford. Cambridge: Cambridge University Press, 301-360, 1992.

- ID *On the Form and Principles of the Sensible and the Intelligible World [Inaugural Dissertation]*. In *Theoretical Philosophy, 1755-1770*. Translated and Edited by David Walford. Cambridge: Cambridge University Press, 373-416, 1992.
- PGR *Physical Geography*. In *Natural Science*. E. Watkins (ed.), Cambridge: Cambridge University Press, 441-682, 2012.
- OPG57 ‘Plan and announcement of a series of lectures on physical geography with an appendix containing a brief consideration of the question: Whether the West winds in our regions are moist because they travel over a great sea.’ In *Natural Science*. Edited by Eric Watkins. Translated by Olaf Reinhardt. Cambridge: Cambridge University Press, 386-395, 2012.
- OPG65 ‘M. Immanuel Kant’s announcement of the programme of his lectures for the winter semester 1765-1766.’ In *Theoretical Philosophy, 1755-1770*.’ Translated and Edited by David Walford. Cambridge: Cambridge University Press, 287-300, 1992.
- DR75 ‘Of the Different Races of Human Beings [1775].’ In *Kant and the Concept of Race*. Edited and Translated by Jon Mikkelsen. Albany: State University of New York Press, 41-54, 2013.
- DR77 ‘Of the Different Races of Human Beings [1777].’ In *Anthropology, History, and Education*, G. Zöllner and R. Loudon (eds.), Cambridge: Cambridge University Press, 82-97, 2007.
- A/B *Critique of Pure Reason*. Translated by P. Guyer & A. Wood. Cambridge: Cambridge University Press, 1999.
- P *Prolegomena to Any Future Metaphysics*. Translated and Edited by G. Hatfield. Cambridge: Cambridge University Press, 2004.
- RHI ‘Reviews of Herder’s Ideas on the Philosophy of the History of Mankind.’ In *Anthropology, History, and Education*, G. Zöllner and R. Loudon (eds.). Cambridge: Cambridge University Press, 124-142, 2007.
- D ‘Determination of the Concept of a Human Race.’ In *Anthropology, History, and Education*, G. Zöllner and R. Loudon (eds.), Cambridge: Cambridge University Press, 145-159, 2007.
- CPrR *Critique of Practical Reason*. Translated by Mary Gregor. Cambridge: Cambridge University Press, 2015.
- MF *Metaphysical Foundations of Natural Science*. Trans. & ed. M. Friedman. Cambridge: Cambridge University Press, 2004.

- TP ‘On the use of teleological principles in philosophy.’ In *Anthropology, History, and Education*. Edited by Gunter Zöllner and Robert Louden. Translated by Gunter Zöllner. Cambridge: Cambridge University Press, 195-218, 2007.
- CPJ *Critique of the Power of Judgment*. Translated by Paul Guyer. Cambridge: Cambridge University Press, 2000.
- A *Anthropology from a pragmatic point of view*. In *Anthropology, History, and Education*. Edited by Gunter Zöllner and Robert Louden. Translated by Robert Louden. Cambridge: Cambridge University Press, 227-429, 2007.

#### *Nachlass*

- PGHo *Physische Geographie Holstein*. In *Vorlesungen über die Physische Geographie*, vol. 26.1 of *Kant’s gesammelte Schriften*. Edited by Werner Stark: Walter de Gruyter, 7-320, 2009.
- PGHe *Physische Geographie Hesse*. In *Vorlesungen über die Physische Geographie*, vol. 26.2.1 of *Kant’s gesammelte Schriften*. Edited by Werner Stark: Walter de Gruyter, 1-296, 2020.
- PGK *Physische Geographie Kaehler*. In *Vorlesungen über die Physische Geographie*, vol. 26.2.1 of *Kant’s gesammelte Schriften*. Edited by Werner Stark: Walter de Gruyter, 297-616, 2020.
- PGD *Physische Geographie Dönhoff*. In *Vorlesungen über die Physische Geographie*, vol. 26.2.2 of *Kant’s gesammelte Schriften*. Edited by Werner Stark: Walter de Gruyter, 743-1092, 2020.
- MH *Metaphysik Herder, 1762-1764*. In *Vorlesungen über Metaphysik*, vols. 28.1 and 28.1.1 of *Kant’s gesammelte Schriften*. Edited by Gerhard Lehmann. Berlin: Walter de Gruyter, 1-524, 525-987, 1968/1970.
- MM *Metaphysik Mrongovius, 1782-1783*. In *Vorlesungen über Metaphysik*, vol. 29.2 of *Kant’s gesammelte Schriften*. Edited by Gerhard Lehmann. Berlin: Walter de Gruyter, 747-940, 1983.
- ML *Metaphysik L, 1790-1791?*. In *Lectures on Metaphysics*. Translated and Edited by Karl Ameriks and Steve Naragon. Cambridge: Cambridge University Press, 299-356, 1997.
- BL *Blomberg Logic*. In *Lectures on Logic*. Translated and Edited by J. Michael Young. Cambridge, Cambridge University Press, 5-250, 1992.
- VL *Vienna Logic*. In *Lectures on Logic*. Translated and Edited by J. Michael Young. Cambridge, Cambridge University Press, 251-380, 1992.

- HL*      *Hechsel Logic*. In *Lectures on Logic*. Translated and Edited by J. Michael Young. Cambridge, Cambridge University Press, 381-430, 1992.
- DWL*      *Dohna-Wunlacken Logic*. In *Lectures on Logic*. Translated and Edited by J. Michael Young. Cambridge, Cambridge University Press, 431-520, 1992.
- JL*      *Jäsche Logic*. In *Lectures on Logic*. Translated and Edited by J. Michael Young. Cambridge, Cambridge University Press, 521-642, 1992.
- FI*      ‘First Introduction to the *Critique of the Power of Judgment*.’ In *Critique of the Power of Judgment*. Translated by Paul Guyer. Cambridge: Cambridge University Press, 1-52, 2000.
- OP*      *Opus postumum*. Edited by Eckart Förster. Translated by Eckart Förster and Michael Rosen. Cambridge: Cambridge University Press, 1993.
- C*      *Correspondence*. Translated and edited by Arnulf Zweig. Cambridge: Cambridge University Press, 1999.
- NF*      *Notes and Fragments*. Edited by Paul Guyer. Translated by Curtis Bowman, Paul Guyer and Frederick Rauscher. Cambridge: Cambridge University Press, 2005.

## *Introduction*

Immanuel Kant spent his life in awe of nature's immense complexity and the potentially infinite number of material things, which exceeds anything we could expect in advance. He was captivated by the human capacity to orient ourselves in the face of such vast empirical diversity, and, by recognizing our finite standpoint within the causal process of nature, to seek affinities between objects, to craft empirical concepts that pick out their essential qualities, and to classify the variety of things in the system of nature. To this extent Erich Adickes is right to portray him as a *Naturforscher*: Kant denied that logical possibility can tell us what is really possible, and anchored scientific knowledge in the actual.<sup>1</sup> Nowhere is Kant's admiration for the diversity of material things more obvious, and his fascination for the response it evokes in the human understanding more apparent, than his extensive writings and lectures on natural history. While he was famously reluctant to leave his beloved Königsberg, Kant devoured the latest travel writings and natural histories pouring into Europe from the rapidly growing trade routes and the unbridled expansion of the colonial frontier. Over his lengthy career, he never ceased from lecturing on current debates in natural history, or from discerning what those debates reveal about human knowledge.

This book undertakes a contextual and systematic study of Kant's account of natural history. It has two major aims. The first is to reconstruct Kant's writings and lectures on classification within the methodological debates unfolding in the eighteenth century concerning the extension of Newtonian science from mathematical physics to the generation of material things. While recent scholarship frames Kant's work on natural history within the human origins debate unfolding in Prussian periodicals during the 1770s and 80s,<sup>2</sup> or the development of a biological science at the close of the century,<sup>3</sup> I argue that it must first be understood in the context of earlier attempts to reconceive of the logical categories *genus*, *species*, and *variety* as physical concepts

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<sup>1</sup> In *Kant als Naturforscher*, Adickes challenges the predominant readings of Kant in the early twentieth century as a natural scientist (*Naturwissenschaftler*) or a philosopher of nature (*Naturphilosoph*). Taking Kant's work as a whole, including his unpublished lectures, remarks and letters, he argues that Kant is better understood as a *Naturforscher*, an investigator of nature's empirical, philosophical and metaphysical dimensions. Throughout the study I stress the nascent use of the term 'natural science' in eighteenth century natural philosophy, which Kant ambitiously sought to define according to the structure of rational thinking. Natural science did not have a stable meaning until well into the nineteenth century, and the term 'natural scientist' did not exist during Kant's lifetime. I thus avoid using the term 'scientist' or 'natural scientist' to describe those who investigate nature's structure, and favour 'natural philosopher' or 'naturalist' as a translation of Adickes' *Naturforscher*. Adickes, *Kant als Naturforscher*, I 1-7. See Ross, 'Scientist: The Story of a Word', 67-8; Toulmin & Goodfield, *The Discovery of Time*, 241.

<sup>2</sup> Eze, 'The Color of Reason'; Serequeberhan, 'Eurocentrism in Philosophy'; Bernasconi, 'Who Invented the Concept of Race?'

<sup>3</sup> Lenoir, *The Strategy of Life*; Lagier, *Les races humaines selon Kant*; Fisher, 'Kant's Explanatory Natural History'; Zammito, *The Gestation of German Biology*.

that represent causal connections in a self-producing, mechanical system if Kant's significance in the history of science is to be fully appreciated.

Building on this contextual reconstruction, the second aim of this book is to present a new interpretation of the place of natural history in Kant's theory of natural science, and to show how this interpretation can enhance our understanding of the difficult and sometimes perplexing account of reason's regulative use in his critical philosophy. Scholars generally accept that while Kant's early work on natural history advanced a radical, explanatory conception of natural history (*Naturgeschichte*) in the vein of Georges-Louis Leclerc Comte de Buffon's *Histoire naturelle* (1749), his critical turn in the 1770s and 80s staged with a 'historical retreat' to something much closer to the descriptive project (*Naturbeschreibung*) presented in Carl Linnaeus' *Systema naturae* (1735).<sup>4</sup> In contrast, I argue that while Kant's critical philosophy separates natural history from proper science, it does not follow that it is limited to a logical procedure of classification. Drawing from both Kant's work on natural history and his critical epistemology, I contend that Kant aimed to present and surpass a dialectic between the logical and physical conceptions of the natural system represented by the Linnaean and Buffonian schools of taxonomy, which, in his view, continued to stifle the progress of natural history in the late-eighteenth century. Kant's transcendental vindication of Newtonian mechanics demonstrated that the natural historian is required to judge the generation of material things in accordance with mechanical laws and provides the standard of demonstration to which she must aspire. It is this requirement and standard of demonstration that enabled him to discern the problem that *living* material things pose to the historian of nature, for such things require the introduction of final causes into the field of research if the mechanical ideal of explanation is to be applied to their function and form. Kant's attempt to resolve the problem methodologically, and the historical significance of his solution, will be the focus of this study.

### **Experimental and historical science**

The motivation behind this book lies in the fact that, despite the recent flood of research on the experimental and historical sciences in Kant's philosophy, commentators continue to hold a comparatively negative view of the place of natural history in his system of natural science.<sup>5</sup> Previous scholarship on Kant's theory of natural science focused on the constructive parts of *Critique of Pure Reason*, including the Transcendental Aesthetic and Analytic, and the *Metaphysical Foundations of Natural Science*.<sup>6</sup> Over the past two decades, however, scholars have

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<sup>4</sup> Zammito, 'Teleology then and now', 749. See also Sloan, 'Kant on the history of nature', 629; Lagier, *Les races humaines selon Kant*, 140.

<sup>5</sup> For several monographs that represent this flood of research, see Frierson, *Freedom and Anthropology in Kant's Moral Philosophy*; Zammito, *Kant, Herder and the Birth of Anthropology*; Zuckert, *Kant on Beauty and Biology*; Cohen, *Kant and the Human Sciences*; Breitenbach, *Die Analogie von Vernunft und Natur*; van den Berg, *Kant on Proper Science*.

<sup>6</sup> This can be seen in Kant's early reviewers, in the neo-Kantians, and in the burgeoning field of Kant scholarship in the twentieth century. For just a sample of works, see Fichte, *Science of Knowledge*; Hegel,

developed a broader conception of Kantian science, in which the experimental and historical sciences participate in science as such.<sup>7</sup> This development has led to ground-breaking work on previously overlooked themes in Kant's writings and lectures, including his conception of experimental science,<sup>8</sup> his pioneering work on anthropology,<sup>9</sup> and his account of empirical concepts and particular laws.<sup>10</sup> Moreover, it has demonstrated how these neglected aspects of Kant's writings and lectures help us to better understand his critical philosophy.<sup>11</sup>

When it comes to natural history, however, scholars tend to revert to the older and more restrictive conception of Kantian science.<sup>12</sup> John Zammito speaks for many commentators when he argues that '*Critique of Judgment* (1790) essentially proposed the reduction of life science to a kind of pre-scientific descriptivism, doomed *never* to attain authentic scientificity.'<sup>13</sup> This interpretation was initially proposed in opposition to an optimistic reading of Kant's influence in the development of biology, in which scholars argued that Kant's transcendental account of organic structure anticipated Darwin's comparative anatomy.<sup>14</sup> To quell the recurring image of Kant as a proto-

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*Science of Logic*; Cohen, *Kants Theorie der Erfahrung*; Brittan, *Kant's Theory of Science*; Kemp-Smith, *A Commentary on Kant's Critique of Pure Reason*; Friedman, *Kant and the Exact Sciences*; Ellis, *Scientific Essentialism*.

<sup>7</sup> For instance, in *Kant on Proper Science* van den Berg offers a thorough treatment of how Kant's account of proper science in *Metaphysical Foundations* shapes his account of biological science and methodology. In 'Kant's Normative Conception of Science', Breitenbach proposes the idea of 'normative science' in which proper science projects a standard of demonstration to which other sciences aspire but may or may not reach.

<sup>8</sup> Vanzo, 'Kant on Experiment'; McNulty, 'Rehabilitating the regulative use of reason'; Cooper, 'Kant and Experimental Philosophy'.

<sup>9</sup> Wilson, *Kant's Pragmatic Anthropology*; Clewis, 'Kant's Natural Teleology?'; Cohen, *Kant's Lectures on Anthropology*.

<sup>10</sup> Watkins, *Kant and the Metaphysics of Causality*; Kreines, 'Kant on the Laws of Nature'; Stang, *Kant's Modal Metaphysics*; Massimi 'Grounds, Modality, and Nomic Necessity in the Critical Kant'; Messina, 'Kant's Necessitation Account of Laws and the Nature of Natures'; Engelhard, 'The Problem of Grounding Natural Modality'; Geiger, *Kant and the Claims of the Empirical World*.

<sup>11</sup> For instance, Louden (*Kant's Impure Ethics*) and Frierson (*Freedom and Anthropology in Kant's Moral Philosophy*) argue that Kant's anthropology and history vindicate the 'empirical part of ethics' that remains undeveloped in the critical philosophy. Others including Cohen (*Kant and the Human Sciences*), van den Berg (*Kant on Proper Science*), McNulty ('Rehabilitating the regulative use of reason') and Breitenbach ('Laws and Ideal Unity') argue that Kant's writings on experimental philosophy vindicate a broad conception of natural science that is underdeveloped in *Metaphysical Foundations*, yet shapes Kant's account of empirical knowledge in the Transcendental Dialectic and the third *Critique*. Mensch (*Kant's Organicism*) and Sloan ('Performing the Categories') contend that Kant's account of generation informs his critical epistemology.

<sup>12</sup> While natural history is discussed in the above-mentioned literature, studies tend to consider Kant's understanding of the subject with other concerns in mind: his precritical cosmology (Massimi, 'Kant's dynamical theory of matter'), his concept of race (Stanford, 'Kant, Race, and Natural History'), his work on human origins (Zammito, *The Genesis of Kant's Critique of Judgment*) and his theory of biology (van den Berg, *Kant on Proper Science*). Sloan ('Kant on the history of nature') offers the most extensive treatment of Kant's natural history in its own right. Fisher offers several reasons for the neglect of natural history in Kant scholarship in 'Kant's Explanatory Natural History', 101

<sup>13</sup> Zammito, 'Should Kant have Abandoned the "Daring Adventure of Reason"?', 135.

<sup>14</sup> This reading has appeared periodically since the consolidation of biology in the mid- to late-nineteenth century. August Stadler advocated this view in 1874, arguing that the transcendental principle of purposiveness presented in the third *Critique* presages the inductive reasoning of Darwin's comparative anatomy. This interpretation rose to such prominence that in his 1910 essay, 'Kant and Evolution', Arthur Lovejoy describes the view that Kant was a precursor to Darwin as one of the 'generally accepted legends

Darwinian biologist, critics point to the schema of natural science presented in *Metaphysical Foundations*, in which natural history is denied the status of a ‘proper natural science’ and classified as a ‘historical doctrine of nature’ (MF 4:468). In contrast to proper natural science, which ‘treats its object wholly according to *a priori* principles’, the historical doctrine of nature begins with experience and works towards the ‘systematic presentation of natural things at various times and places’ (MF 4:468). ‘Systematic’ is taken to refer to the logical ordering of cognitions, disconnected from the apodictic system of natural laws.<sup>15</sup> Several commentators have gone as far as to claim that Kant’s strict view of proper science was crafted to curb the development of a science of life, ensuring that organic form is metaphysically distinct from the material dynamics of nature.<sup>16</sup>

This negative take on Kant’s account of natural history is compounded by the fact that his writings and lectures on natural history confront us with a dimension of his work that has recently caused a great deal of discomfort to Kant scholars: Kant’s concept of race, and, more pointedly, his *racism*.<sup>17</sup> Kant argued that a physical conception of the natural system requires a new set of class concepts that capture causal connections between extended things through time and in space. While race is a general classificatory concept that refers to a physical line of descent in which members of a common species have, in response changes in environment, altered in form, his most sophisticated treatment occurs in the context of a public debate concerning human origins in the 1770s and 80s. In a series of public essays dubbed his *Racenschriften*, Kant deploys his account of empirical knowledge to define skin colour as the primary indicator of a human race, and illustrates a fourfold taxonomy with pernicious claims about the enduring moral and temperamental characteristics of non-white races.<sup>18</sup> While scholars formerly passed over Kant’s racism as an

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of the history of science.’ In 1922, Emil Ungerer argued that Kant’s reflective account of organic unity in the third *Critique* enables the inductive reasoning practiced by biologists in the early twentieth century. Despite heavy resistance in the mid-nineteenth century, it found new life in the work of Timothy Lenoir, which presents Kant as the founder of nineteenth century morphology. Stadler, *Kants Teleologie und ihre erkenntnistheoretische Bedeutung*, 113; Lovejoy, ‘Kant and Evolution’, 538; Ungerer, *Die Teleologie Kants*; Lenoir, *The Strategy of Life*, 2.

<sup>15</sup> Pratt, ‘System-building in the eighteenth century’, 429-30. See also Koselleck, ‘Vergangene Zukunft der frühen Neuzeit’, 546-66.

<sup>16</sup> Zammito, ‘Teleology then and now’, 755; Richards, ‘Kant and Blumenbach on the *Bildungstrieb*’, 229; van den Berg, ‘Kant and the Scope of Analogy’, 75.

<sup>17</sup> In this study I use the term ‘racism’ to refer to judgments about variation in the human species that employ what Michael Hardimon terms a *racialized* concept of race, which is (1) essentialist and (2) hierarchical. A racialized concept of race is one that justifies racial divisions according to normative biological features, such as intelligence and moral character, which can be used to rank the races as inferior and superior. See Hardimon, *Rethinking Race*, 2.

<sup>18</sup> Consider an example from ‘Teleological Principles’ (1788). Kant draws on the travel writings of Spanish naval officer Don Antonio de Ulloa to make an empirical claim that members of the Native Americans race are ‘too weak for hard labor, too indifferent for industry and incapable of any culture’ (TP 8:176). While such a remark could, on its own, be considered as a product of its time, Kant then claims that ‘hardly another reason could be given’ for such indolence other than that ‘their natural disposition [*Naturanlagen*] did not achieve a *perfect* suitability for any climate’ (TP 8:175). This claim about the developmental history of a natural disposition justifies Kant’s hierarchical inference that the Native American race ‘ranks still far below even the Negro, who stands on the lowest of all the other steps that we have named as differences of the races’ (TP 8:176).

unfortunate product of its time,<sup>19</sup> new research pioneered by Emmanuel Eze, Charles Mills, and Robert Bernasconi contends that Kant was in fact the pioneer of a ‘scientific’ conception of race that assisted white Europeans to clothe their felt sense of cultural superiority in the garb of Enlightened knowledge.<sup>20</sup> Thus framed, Kant’s theory of race is not – as he states in the 1775 course announcement to his lectures on physical geography – a mere ‘game’ played alongside the ‘deep inquiry’ of philosophy (DR75 2:429).<sup>21</sup> It anticipates and flows from his critical philosophy, which establishes the conditions of scientificity. More seriously, it poses a threat to the universalist moral and political theory he developed during the 1780s, for his belief that certain races have permanently degenerated from an original stem leads him to deny members of those races full consideration as moral persons.<sup>22</sup> Given the weight of this threat, it would surely be good news to Kant scholars if his account of natural history were *not* scientific.<sup>23</sup>

While united by a negative take on Kant’s account of natural history, the existing literature is divided. Scholars working on the history of biology tend to argue that Kant denied natural history the status of a science. Those working on his concept of race tend to claim that his physical system of nature pioneers a distinctly scientific natural history. Noting this predicament, Phillip Sloan contends that we are yet to fully appreciate the connection between Kant’s class categories and the regulative method prescribed by reason in his first and third *Critiques*. Further work is needed ‘before we can assess the full importance of the race treatises for Kant’s larger project.’<sup>24</sup>

With this need in mind, my approach in this study is to investigate Kant’s writings and lectures on natural history in the context of his broader philosophical development. My central claim is that the relation between Kant’s general theory of natural science and his account of natural history has been misunderstood. To drive a wedge between natural history and natural science, or to conflate the two entirely, is to misinterpret his theory of science. In this study I hope to shift the

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<sup>19</sup> Mills characterizes this view as the prevailing position in Kant scholarship, which he describes as follows: ‘Ok, Kant was a racist, but that doesn’t affect his theories.’ Mills, ‘Kant and Race, Redux’, 2. See Loudon, *Kant’s Impure Ethics*, 105; Hill and Boxill, ‘Kant and Race’, 449.

<sup>20</sup> Bernasconi describes Kant as ‘the inventor of the concept of race’, by which he means ‘the one who gave the concept sufficient definition for subsequent users to believe that they were addressing something whose scientific status could at least be debated.’ Bernasconi, ‘Who Invented the Concept of Race?’, 11. For overviews of the recent literature, see Mikkelsen, ‘Recent Work on Kant’s Race Theory’, and Sloan, ‘The essence of race’.

<sup>21</sup> Kant dropped this disclaimer when he published the essay in the popular journal *Der Philosoph für die Welt* in 1777 (see Section 4.4).

<sup>22</sup> Eze, ‘The Color of Reason’; Serequeberhan, ‘Eurocentrism in Philosophy’; Mills, ‘Kant’s *Untermenschen*’; Bernasconi, ‘Kant as an Unfamiliar Source of Racism’. C.f. Hill & Boxill, ‘Kant and Race’; Allais, ‘Kant’s Racism’; Kleingeld, ‘Kant’s Second Thoughts on Race’. For an overview of the various positions that have consolidated in the literature, see Frierson, *What Is the Human Being?*, 101-18. Recent work has also argued that Kant’s concept of race plays a greater role in his critical epistemology than many Kant scholars are comfortable to acknowledge. See Lagier, *Les races humaines selon Kant, Mensch, Kant’s Organicism*; Sanford, ‘Kant, Race, and Natural History’.

<sup>23</sup> For a helpful insight into the implications of the threat, see the debate between Banton and Bernasconi in *Ethnicities*: Banton, ‘The Vertical and Horizontal Dimensions of the Word *Race*’; Bernasconi, ‘Defining Race Scientifically’.

<sup>24</sup> Sloan, ‘The essence of race’, 194.

parameters of debate by drawing scholarship on Kant's account of natural history into conversation with recent work on his broader conception of science. I argue that the debate's current framing does not sufficiently contextualize Kant's account of empirical knowledge within the contested landscape of Newtonian science, leading scholars on both sides to overlook his decisive contribution to one of the most significant developments in eighteenth century natural philosophy: the inclusion of *time* as the methodological frame in which explanations are required, sought after, and justified in natural history.<sup>25</sup> Kant's critical reflection on the method of classification can be viewed as a culminating moment in what I term *the transformation of natural history*, a seismic shift occurring in eighteenth century philosophy whereby natural history ceased to be understood as the logical practice of classification and was reconceived as the presentation of a physical process. In the midst of the epistemic and metaphysical problems raised by this transformation, Kant aspired to determine how historical claims can be scientific. His answer, I submit, had significant implications for his critical account of reason's regulative use, and raises a challenge for the logic of historical reasoning today.

An upshot of this claim is that Kant's concept of race is indeed part of a scientific conception of natural history. While the moral and political implications of his race concept lie beyond the scope of this study, I aim to show that Kant's theory of science encompasses a broader set of concepts and laws than those that can be established with certainty and completeness. Kant's broad conception of science, I contend, entails that his empirical beliefs about racial characteristics are contestable, prone to error, and subject to ongoing revision. This by no means saves Kant from the charge of racism. Indeed, it will enable us to better discern the workings of racism in the formation of his empirical beliefs. What it does do, however, is loosen the connection between his racism and his theory of natural science. Kant's method for the acquisition of empirical knowledge replaces the natural historian's hope that a logically coherent system will somehow converge with a preestablished reality with a procedure by which historical claims can be genuinely contested. Empirical beliefs – including Kant's beliefs about racial characteristics – are 'scientific' to the extent that they can be evaluated against (a) possible experience (synthetic *a priori* knowledge), (b) actual experience (the available evidence), and (c) their fit within a physical system of empirical concepts. By shifting historical knowledge from the frame of correspondence to an intersubjective sphere in which claims must be defended against a shared standard, Kant's method issues to his readers a clear invitation to critically examine his historical reasoning. I argue that when judged against this standard, his empirical beliefs about racial characteristics lack the justification required to merit the positive epistemic attitude he clearly adopts toward them, revealing several of his

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<sup>25</sup> Phillip Sloan and John Lyon argue that, while often overlooked, this transformation was 'as great an intellectual event as the scientific revolution of the seventeenth century.' Sloan and Lyon, 'Introduction', 3. Gould makes a similar claim in *Time's Arrow, Time's Cycle*, 1-2. While most scholars point to the Copernican revolution and the Darwinian revolution as the two defining moments in the development of science, Gould argues that the discovery of 'deep time' links them together.

failings as a *Naturforscher*. To elucidate Kant's misplaced credence, I follow the lead of Lucy Allais, who contends that our task is not to seek a coherent way of accounting for Kant's racism but rather to understand just how 'pervasive [racism] can be in a person's belief system and resistant to evidence.'<sup>26</sup>

## Chapter overview

I have written this book with two audiences in mind. It is first of all a work of Kant scholarship, and aspires to contribute to the growing body of literature on the experimental and historical sciences in Kant's philosophy. However, it does so by situating his account of natural history within the broader transformation considered in this study, and thus also seeks to extend recent work on the role of Newtonianism in the early development of biology.<sup>27</sup> The dual focus of the study may, of course, fail to satisfy readers whose interest lies solely in one of these two bodies of work. Yet I will try to show that a constructive dialogue between Kant scholarship and the history of science can raise provocative questions for scholars working in both fields. The conviction guiding this study is that our understanding of Kant's account of scientific knowledge can be enhanced by a broader investigation of the contribution he attempted to make to natural history's transformation. As recent work by John Zammito and Joan Steigerwald has shown, this transformation did not occur as a discontinuous *snap* in the history of science, as if the developmental conception of nature could suddenly replace a static, logical schema of natural history.<sup>28</sup> For the established community of natural philosophers to accept a new program of research that investigates natural objects as products of a physical process, a deep epistemological and metaphysical shift would have to occur.<sup>29</sup> In terms of epistemology, it would require a change in the foundation of empirical knowledge that could overcome the skepticism held by natural

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<sup>26</sup> Allais, 'Kant's Racism', 20.

<sup>27</sup> See Hall, 'On Biological Analogs of Newtonian Paradigms'; Schlanger, *Les métaphores de l'organisme*; Wolfe, 'On the Role of Newtonian Analogies'; Zammito, *The Gestation of German Biology*; McLaughlin, 'The Impact of Newton on Biology'.

<sup>28</sup> Narratives in which the atemporal conception of natural order assumed by natural historians is eclipsed by the developmental system of biology at the turn of the nineteenth century prevail in the literature. For instance, Ernst Mayr (*This Is Biology*, 29) argues that natural theology enshrined natural history as the science of living beings, meaning that 'biology was basically dormant until the nineteenth and twentieth centuries.' While Michel Foucault (*Les mots et les choses*, 139) presents an alternative genealogy, it has a similar result: before the advent of biology in the early nineteenth century, 'life itself did not exist. Only living beings existed, which were viewed through a grid of knowledge constituted by *natural history*.' In the past few years, a number of scholars have taken Foucault's claim as an investigative challenge to interrogate the supposed dichotomy between natural history and biology. See Zammito, *The Gestation of German Biology*, 1, and Steigerwald, *Experimenting at the Boundaries of Life*, 15-6. While I am indebted to these studies, my investigation will not focus on the biological writings that emerged around 1800 but rather on the century leading up to this period.

<sup>29</sup> See Sloan and Lyon, 'Introduction', 18. François Russo identifies four fundamental dimensions to this shift, yet they also boil down to a metaphysical dimension concerning generation and development, and an epistemological dimension concerning how we attain knowledge of historical change. Russo, 'Théologie naturelle et secularisation de la science au XVIII siècle', 43.

philosophers in regards to our knowledge of processes that lie beyond the reach of experience, such as changes undergone in the earth's history. This change would have to permit certain forms of speculative reasoning about events that occurred long ago, and define a new standard of epistemic justification for historical claims. In terms of metaphysics, it would require the integration of the formative principles of organic development into the natural order, such that living beings could be understood as products of natural forces. Thus conceived, the fit between organic function and environment would no longer be understood according to the causality of a designer but rather as the consequence of a developmental process that occurred over a long period of time, such that living things are considered as products formed in dynamic relation to the broader changes undergone in the earth's history, including geophysical development, climactic variation, and the movement of other living beings.

In Part I of the study I argue that the key to this epistemological and metaphysical shift lies in the extension of Newtonian science from the movement of material bodies to the generation of natural products, thereby broadening the scope of experimental philosophy to include geology, geography, botany, and zoology. I begin in Chapter 1 by arguing that the intensive practice of natural history during the Renaissance raised a problem for the Aristotelean tradition of natural interpretation taught in the schools, for it became increasingly apparent that the properties used to classify individuals within a group are, at least in part, arbitrarily selected by the student of nature. I characterize this problem in terms of a gap that opened between the ordering of names and the ordering of things. Starting with Francis Bacon's attempt to replace Aristotle's *Organon* with a new method for interpreting nature, I show how the experimental turn in natural philosophy placed natural history at the foundation of a new hierarchy of learning. I explore the implications of this turn in the following generation of British natural philosophers, including Robert Boyle, Isaac Newton, and John Locke, who drew from Bacon's *Novum organum* to separate two kinds of classificatory system: a natural system, which represents the essential divisions between natural things, and an artificial system, which arranges the manifold of nature according to human interests. I conclude with Carl Linnaeus' *Systema naturae*, which presents a method by which artificial classification can track natural boundaries.

In Chapter 2 I argue that the epistemological and metaphysical changes required to establish a physical conception of the natural system, understood as a presentation of the changes that nature has undergone through time, were made possible by the extension of Newtonian science to events and processes that are not strictly amenable to mathematical demonstration. If Newtonian science upholds Newton's official claim that the possibility of material motion is unknown, then its explanatory power lies simply in the ability to describe the movements of material bodies according to attractive and repulsive forces. On this 'mechanical' interpretation of Newtonianism, advanced by Stephen Hales' plant physiology, the natural philosopher applies the Newtonian forces to the unfolding of natural products understood as preexisting machines. Yet if Newtonian science

could move beyond Newton's epistemic reservations and vindicate metaphysical knowledge of fundamental forces, then material bodies would not simply follow Newtonian laws; they would also be constituted by them. Generation – what Aristotle understood as *motion towards form* – could then be studied as a physical process.<sup>30</sup> On this 'materialist' interpretation of Newtonianism, pioneered by Pierre Louis Maupertuis and Georges Buffon, the possibility of the mechanical system would lie in nature's material conditions. Theoretically, the initial state of Newtonian mechanics could be explained by attractive and repulsive forces, meaning that the order of nature could be studied as a physical achievement. A natural history would not describe and catalogue the manifold of natural objects according to logical affinities, but reconstruct the physical connections between extended things in space and time. Yet several links in this universal conception of natural history, including the original formation of organized beings and variation within a species, continued to resist explanation, leading materialists to fill the gaps with speculative hypotheses. In response, Albrecht von Haller developed an 'analogical' interpretation of Newtonianism, in which the natural philosopher examines recalcitrant phenomena through an analogy with Newton's deduction of the law of universal gravitation, thus leaving the cause of those phenomena unknown.

In Parts II and III I argue that in both his early and mature work Kant aspired to make a decisive contribution to the transformation of natural history. In Part II I provide evidence to show that Kant's early account of natural history extends the materialist interpretation of Newton championed by Maupertuis at the Berlin Academy. Scholars tend to interpret Kant's Newtonianism in direct relation to Newton's *Principia*, overlooking the developments in Newtonian science that occurred in the first half of the eighteenth century.<sup>31</sup> This has led to considerable misunderstanding of the early Kant's relation to Newton, for it remains unclear why he would frame his early defence of Newtonian physics in the form of a natural history. In Chapter 3 I argue that Kant's *Universal Natural History* (1755) extends Buffon's physical account of knowledge, in which a universal natural history recounts the generation of the entire system of natural phenomena from just a few natural laws, thereby reducing the contingent appearance of design to material necessity. Thus

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<sup>30</sup> Here I extend beyond the conventional focus on the various theories of generation (preformation, epigenesis, etc.) to include the interpretations of Newtonianism that constrain the hypotheses one might legitimately entertain. To examine the various theories of generation without this background can lead one to misinterpret the decisive points of disagreement. See Wolfe, 'Why Was There No Controversy Over Life in the Scientific Revolution?', 209-10.

<sup>31</sup> There are several notable exceptions to this neglect. Zammito identifies several different ways of applying Newton's method under the banner of Schofield's 'experimental' Newtonianism. However, his presentation oversimplifies the diversity of positions, for it examines the Newtonianism practiced by natural philosophers as diverse as Hales, Haller and Kant within the single framework of 'experimental Newtonianism'. Zammito, *The Gestation of German Biology*, 37-8. Massimi has made some headway in recognizing the influence of the materialist interpretation of Newtonianism on the pre-critical Kant. Yet she also relies on Schofield's topology, which has been improved in the literature. Massimi, 'Kant's dynamical theory of matter', 533. I draw instead from Wolfe's more sophisticated topology of eighteenth century Newtonianisms in 'On the Role of Newtonian Analogies in Eighteenth-Century Life Science'. See also Sloan, 'Life Science and *Naturphilosophie*', 99.

conceived, nature is no longer understood as a divinely ordered system of bodies on a geometrical plane, but as a self-actualizing process that generates its own spatial and temporal conditions. History is no longer a description of natural order, but a narrative of the changes that explain nature's present state.

Kant's extension of materialism clarified the problem that *living* natural products pose to a universal natural history. Living natural products can only be examined as developing through time if the natural historian assumes the operation of a generative force by which members of a species adapt to changes in climate, landscape, and other living beings. In Chapter 4 I consider a tension emerging in the student notes taken from Kant's lectures on physical geography between living natural products and the mechanical-teleological system presented in *Universal Natural History*. While Kant structured his physical geography according to Buffon's distinction between a general theory of the earth and the history of particular natural products, I suggest that during the 1760s he recognized an error in Buffon's materialist account of generation. The error occurs when the natural historian takes the subjective conditions of the intellect as the objective conditions of nature. The implications of Kant's recognition of the error can be seen in his 1777 essay on race, which presents a physical procedure of classification based on projected casual connections between individuals in a line of descent. I argue that the structure for Kant's concept of race is drawn from Abraham Kästner's 1772 translation of Buffon's article 'On the degeneration of animals' (1766), which grounds racial boundaries on the distinction between the accidental and necessary variation of a stem species. Yet to avoid Buffon's error, and thus to resolve the tension between living natural products and the mechanical-teleological system, Kant develops a second, pragmatic tier of natural history situated within the formal conditions of nature. In contrast to Buffon, Kant's concept of race is 'real' to the extent that it captures an enduring line of descent, whose defining characteristics become fixed. I argue that Kant's 1777 essay presents a *racialized* concept of race, which enables him to formulate several of his assumptions as (racist) empirical beliefs. The question considered in the remaining chapters is whether Kant's critical philosophy bolsters or resists those beliefs.

In Part III I argue that Kant's ongoing engagement with epistemic problems arising in the practice of natural history play an important and yet underappreciated role in the development of his critical philosophy. In Chapter 5 I argue that Kant's account of reason's regulative use in *Critique of Pure Reason* can be understood against the backdrop of the methodological questions concerning the use of hypotheses in natural philosophy considered in Parts I and II of this study. I argue that following his recognition of the error that plagues historical reasoning, Kant no longer grounds natural history in matter understood as extended substance, the possibility of which is unknown. Kant clarifies his position in the critique by grounding historical knowledge in the universal laws that govern material substance, the possibility of which lies in the understanding. Turning to the account of reason's regulative use in the Transcendental Dialectic, I argue that Kant's examination of the synthetic application of reason to the understanding in the context of

empirical research captures two conflicting demands on the natural historian. The first demand is the recognition of cognitive limits. To work toward a physical system of classification, the natural historian must acknowledge a tendency in human reason to conflate a logical system represented in the mind with the system of nature. The second demand is that there *is* a system to be found; that natural *things* are arranged in a way that can be discovered by minds like ours. Both the skeptical natural historian, who seeks for logical connections between observations, and the radical natural historian, who seeks for causal connections between natural products, presuppose that nature meets our expectation that systematic connections can be found. Neither takes the first demand (the recognition of cognitive limits) to its conclusion. Moved by the first demand, Kant restricts cognition to the finite conditions of the understanding. Moved by the second demand, he anchors historical reasoning in reason's hypothetical use, which prescribes the *relations* between appearances and their conditions. Kant thus combines the metaphysical question of nature's systematicity with the epistemological question of cognitive limits to remove the influence of metaphysics from natural history and determine an immanent standard for assessing the veracity of historical claims.

While the *Critique* vindicates the objective validity of the understanding's categories, Kant's account of reason's hypothetical use leaves the real use of reason's ideas in a precarious position. In the Appendix to the Transcendental Dialectic, Kant argues that the synthetic use of reason has an 'indirect' objective validity, for it enables the formation of physical hypotheses that can be tested against experience. In the mid-1780s, however, Kant's participation in the public debate on human origins demonstrated that his account of reason's regulative use required further work. In Chapter 6 I consider Kant's writings on natural history in the mid-1780s as a case study of how his critical account of empirical knowledge applies in practice. I argue that in the course of responding to Johann Gottfried Herder and Georg Forster's respective attacks on his concept of race, Kant was forced to refine his account of reason's regulative use in the context of empirical research. Recognizing that the account presented in the first *Critique* did not sufficiently justify the examination of living things as natural products, he proposes a new kind of analogy that enables the natural historian to reflect on the whole-to-part dynamics of organized beings through the form of our own purposiveness as practical agents. This new kind of analogy requires the operation of judgment without the aid of the understanding, such that judgment prepares the field for the application of the understanding's concepts to living natural products. I suggest that this move loosens the fixity built into his racialized concept of race, and exposes several of the assumptions that motivate Kant's empirical beliefs about the natural characteristics of human races.

In Chapter 7 I examine *Critique of the Power of Judgment* as a culminating moment in Kant's work on natural history, for it demonstrates how the competing theories of generation are natural for a discursive cognition like ours as it enters more deeply into the demands of empirical nature. Kant traces these theories back to two maxims generated by reflecting judgment in the

course of empirical research. The two maxims give rise to an antinomy that captures the conflicting requirements bearing on the natural historian that, if left undiagnosed, give rise to an illusion that entices her to commit the errors of historical reasoning. In contrast to commentators who claim that Kant's presentation of a 'daring adventure of reason' stands a warning against the unbridled use of imagination, I argue that his resolution to the antinomy of reflecting judgment does not curtail the explanatory power of natural history but rather clarifies its epistemic status. Reason's daring adventure is the natural course that the natural historian must take as she extends the reach of her understanding, which is why she must practice discipline if her research is to remain within the bounds of contestable scientific knowledge. Nature summons the natural historian to search for the undetermined genus of the individuals we encounter in experience, up to the limit of an original organization, the possibility of which cannot be determined by a discursive cognition like our own. The boundaries between classificatory concepts thus become transitional through time, such that Kant's concept of race can no longer serve as a fixed anchor in natural history.

In sum, this study aims to extend recent literature on Kant's theory of science by demonstrating that his extensive work on natural history plays a greater role in his transcendental justification of Newtonianism than has hitherto been acknowledged. My contention is that Kant's *a priori* conception of proper science was not a foil to biology, as if the field we know today were gestating in the work of his opponents.<sup>32</sup> Yet neither was his account of natural purposiveness a proto-Darwinian theory of morphological change.<sup>33</sup> Kant's account of natural science features within a series of attempts made by natural philosophers in the eighteenth century to anchor the historical examination of natural products in a defensible metaphysics of nature. These attempts continued to face theoretical problems, for they were unable to reconcile Newton's mathematical account of force with either a physical-mechanical conception of the natural system or the material generation of living things. Kant's critical philosophy alters the field, for by anchoring natural science in the structure of rational thought it removes the reconstruction of past events from the domain of possible cognition and places it in an intersubjective sphere of historical knowledge.

While Kant denies that the reconstruction of past events can appear as an object of cognition, it does not follow that historical speculation is fictional. In this study I argue that Kant's

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<sup>32</sup> In this study I avoid using the term 'biology' to refer to various attempts to account for the generation of living things during the seventeenth and eighteenth centuries. While biology was first used to refer to an independent domain of scientific inquiry in France and Germany during the 1790s, with a few scattered uses in the preceding decades, a working definition did not emerge until around 1802. There are several earlier texts that identify biology as a distinct region of scientific knowledge, such as Roose's *Grundzüge de Lehre von der Lebenskraft* (1797). However, most studies identify its first use to define a unified field of inquiry in Gotthelf Reinhold Treviranus' *Biologie, oder Philosophie der lebenden Natur für Naturforscher und Aerzte* (1802). See Jahn, *Grundzüge der Biologiegeschichte*, 258, 275, 298; Lepenies, *Das Ende der Naturgeschichte*, 29-30; Ballauff, *Die Wissenschaft vom Leben*, 326; Lenoir, 'The Strategy of Life', 1; Gambarotto, *Vital Forces, Teleology and Organization*, xv.

<sup>33</sup> My argument thus charts a position between Lenoir's biological Kant and Zammito's reaction against it. Thus, it is fundamentally indebted to the pioneering work of both scholars.

account of natural history constitutes a third kind of system that stands between the apodictic system of natural science and the logical system of reason. Natural history for Kant is a physical system of empirical concepts that can, given the right method, demand our assent. While natural history is produced by reason's hypothetical use, for the natural historian works back from actual objects to projected alterations that occurred long in the past, it is nevertheless a *physical* system, for historical reasoning is guided by and judged against the standard of rational physics. In this sense Kant's physical system is not dissimilar to what contemporary philosophers of science describe as a model, and it raises a similar set of epistemological and metaphysical questions regarding how we ought to judge the truth of an idealization.<sup>34</sup> For Kant, the difference between natural science and natural history is that while the truth of natural science is certain and thus non-revisable, the truth of natural history is determined by our consciousness of the reason we have for *judging* hypotheses to be true. Historical claims can merit our assent, and even count as knowledge, yet they remain open to revision as regions of knowledge become available to empirical investigation. The attentive reader of Kant's critical philosophy is thus invited to evaluate the empirical beliefs expressed in his writings – such as his empirical beliefs about racial characteristics – against this method, and to discern whether those beliefs are warranted. I argue that Kant's beliefs about racial characteristics are not warranted, and betray serious weaknesses as a *Naturforscher*. I conclude that Kant's contribution to the immense shift occurring in eighteenth century natural philosophy is to show how the achievements made in Newtonian science can furnish natural history with a method that determines how the natural historian ought to proceed and which empirical beliefs she is licenced to adopt. He thus identifies a standard by which natural historians can have genuine disagreement and potentially come to consensus, which, I suggest, was a ground-breaking achievement in eighteenth century natural philosophy.

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<sup>34</sup> For an insightful comparison of Kant's account of empirical knowledge and the use of models in contemporary science, see Massimi, 'From data to phenomena', 110-1.

