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What To Do With Seventeenth-Century Natural Philosophy? A Taxonomic Problem

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The issue at stake
According to our history books, modern philosophy and modern science were both born in the seventeenth century. If this was merely a matter of temporal coincidence, there would be nothing remarkable about it. But the two phenomena appear to be connected: historians of philosophy and historians of science do not only look to the same time period for the birth date of their respective modern histories, but they often look to the same people and in some cases even to the same texts.

What are the implications of this overlap? If the history of philosophy and the history of science could be so completely mapped upon each other as to appear as one identical enterprise, this would constitute a lesser problem. It would then suffice to explain how it came that two enterprises that today are quite distinct pursuits joined hands for a certain period. But the problem is much more vexing than that: while it is generally understood that the redefinition of philosophy and the birth of modern scientific methods are linked phenomena, no one has ever taken them to constitute identical enterprises. At the same time, the type of link between the two...

phenomena continues to be debated. Must we assume the existence of an essential bond between the two, or did the development in one field trigger a revolution in the other?

One of the main keys to the understanding of the nature of this puzzle lies with “natural philosophy” and with the enormous growth and reorientation of this discipline in the seventeenth century. “Natural philosophy” had for centuries been a bookish discipline “without nature” (John Murdoch 1982) and, while being “empiricist” in nature, had proceeded “without observations” (Edward Grant 2001). It had sought solutions to conceptual riddles and seeming inconsistencies found primarily in Aristotle’s *libri naturales* and in the commentary tradition these texts had engendered. When speaking of “medieval science,” careful historians therefore distinguish between the philosophical and propedeutic discipline of natural philosophy, on the one hand, and those various other activities that must be mentioned among the precursors of modern scientific disciplines, notably medicine; certain techniques in the domains of alchemy or metallurgy; the quadrivial disciplines and notably astronomy; or the mixed sciences and specifically optics.

With regard to the Middle Ages and the Renaissance, then, it is not too difficult to distinguish the explicitly “speculative” and “contemplative” discipline of *philosophia naturalis* or *physica* from those other activities. However, the picture changes fundamentally in the seventeenth century. With the introduction of experimental and mathematical approaches to the study of natural phenomena, traditional differences between speculative thought and practice, literary study and applied labor became blurred. All kinds of non-scholastic activities came to insert themselves into the old scholastic domain of *philosophia naturalis* or *physica*, which in the process turned into a mathematical, chemical, medical, and generally empirical discipline. The confusing consequence was that everyone who was concerned with some aspect or other of the natural world came to consider himself *ipso facto* a “philosopher.” This immense extension of the field of philosophical activity explains also why instruments such as telescopes, prisms, or vacuum pumps came to be regarded as “philosophical instruments.” Although this redefinition of the scope of philosophy to cover experimentation and observation could be (and sometimes was) celebrated as a return to the original Greek spirit of the philosophical enterprise, it obviously far exceeded the definitional boundaries of both what had previously been called “philosophy” and what we nowadays understand by this term.

This situation confronts the modern historian with a series of difficulties and not least with a problem of taxonomy. By calling “philosophical” much of what to us looks like “science,” the seventeenth century
appears to snatch away from historians of science almost all that is of interest to them about this period. At the same time, it forces the historian of philosophy to become a historian of science. This situation explains the following comment by the editors of the Cambridge History, Michael Ayers and Daniel Garber:

We have allowed some compromise between what the term ‘philosophy’ meant then and what it means now. In the seventeenth century it was unremarkable if the same ‘philosophers’ who wrote on metaphysics, logic, ethics, and political theory, on the existence of God, or on the varieties of human knowledge and belief also made contributions to mathematics, offered an account of the laws of motion, peered through microscopes or telescopes, recorded the weather, conducted chemical experiments, practised medicine, invented machines, debated the nature of madness, or argued about church government, religious toleration, and the identity and interpretation of divine revelation. The present ‘history of philosophy’ includes neither a history of natural science nor a history of religious doctrine and practice, but much is said in it about the sometimes surprising connection between theory and argument in such areas and what is more recognizably in ancestral relation to the ‘philosophy’ (or philosophies) of today. One fundamental shift is reflected in the change in the sense of the word ‘science’ (pp. 1–2).

In a similar vein, the general editor of the Ueberweg’s new Philosophie des 17. Jahrhunderts, Jean-Pierre Schobinger, writes in his Introduction:

We must also consider the mathematical, scientific and medical developments, for these were often accompanied by philosophical arguments—which may well constitute a peculiarity of that century. It was a phenomenon, whose frequency decreased with the rapid increase of knowledge in these areas, the establishment of new scientific domains and the increasingly strong experimental orientation of research (p. xliv).²

Schobinger’s observation seems quite correct. The seventeenth century’s “experimental philosophy” presents an historical anomaly which was destined to disappear again, though very slowly, as the consequence of the institutionalization of separate scientific disciplines. But because of its anomalous character, the history of seventeenth-century philosophy is particularly hard to write. Despite the growing willingness to work in an interdisciplinary manner, it is still true that historians of philosophy tend to

². Unless otherwise indicated, all translations are mine.
leave much of natural philosophy to historians of science, while the latter deliberately ignore the philosophical embedding of their “science” and even a good part of what the seventeenth century called “scientia,” notably theology. The question therefore arises of whether the criteria by which these early modern categories are cut up and then reassembled are premeditated and explicit, or whether they are only the expression of the understandable, but nonetheless deeply whiggish desire to find a prehistory for the modern categories and disciplines.

The recent publication of a number of new surveys of seventeenth-century philosophy provide a suitable occasion to review these problems and questions. In the following, I shall examine some of these works to understand how today’s historians of philosophy cope with the problems of taxonomy just mentioned.

However, a few general remarks are in order before we examine these works individually. A comparison of general surveys in the history of science, on the one hand, and in the history of philosophy, on the other, demonstrate that we are still far from seeing a convergence of the two historiographies. It appears that there exist a number of specific areas in which the problems involved in aligning the history of philosophy with that of science are particularly evident, and other areas, where the two historiographies face similar difficulties, but tackle them differently. Since these problem areas provide the categories by which the publications reviewed in this essay will be evaluated, they must be mentioned first.

What to do with the first half of the century?
Let me begin with the following apparent paradox. Historians of science have for decades been discussing whether or not there was such a thing as the “Scientific Revolution.” One of the strange things about this discussion is that the word “revolution” seems profoundly inept for the description of a drawn-out process which lasted hundreds of years, if one believes the title of A. Rupert Hall’s *The Scientific Revolution 1500–1800*, or at least three generations, if one follows more essentialist accounts. Historians of philosophy, by contrast, do not worry about any revolution. Ironically enough, however, the reason for their tranquillity is not that they differ from historians of science in believing in historical continuity. Much rather, they simply accept Descartes’ work as the water-shed that separates modernity from all that went before. For Fontenelle, Descartes was the dividing line in the *Querelle des anciens et des modernes*, Hegel recognized in his writings the rise of reason to independence (“Selbständigkeit”), and Husserl attributed eternal value (“Ewigkeitsbedeutung”) to the radically

sceptical premise of his philosophy. Indeed, Descartes’ award-winning philosophy is still viewed by many historians of philosophy as the evident rebirth of their discipline. “It is thus indeed not implausible to attribute to Descartes the honorific title of being the founding father of philosophical modernity,” Lothar Kreimendahl concludes in his introduction to the *Philosophen des 17. Jahrhunderts* (p. 17).

The result of this belief in the Cartesian one-man revolution is that historians of philosophy, in contrast to historians of science, never quite know what to do with the first half of the seventeenth century. They find that the texts of that period can neither be subsumed under the title of Renaissance philosophy nor lay the premises for the advent of Cartesianism. Hence they think it often best to jump from the Renaissance straight to Descartes, omitting the disorderly period preceding the appearance of their founding father’s clear and distinct ideas. The Routledge *History* exemplifies this method in an almost grotesque manner. Although the volume allegedly covers the 350-year period from the later fourteenth century to the early eighteenth century, a period it defines as “the birth of modern philosophy” (p. i), the general editor, G.H.R. Parkinson, explains that “the substance of the volume is the history of certain important philosophical movements that occurred during this period, namely, Renaissance philosophy and seventeenth-century rationalism” (p. 1). Of these two “important movements,” the first is treated with hasty efficiency, while the second is discussed in great detail. And whatever lies between them is simply left out. The result of this historiographical essentialism is that the volume contains two highly general survey articles (by Jill Kraye and Stuart Brown) dealing with the Renaissance inside and outside of Italy. An equally general article, by George Molland, intends to bring the reader up to date on “Science and mathematics from the Renaissance to Descartes.” Apart from the obligatory article on Francis Bacon (by Antonio Pérez-Ramos), all other articles are devoted to the editors’ heroes: there are two articles on Descartes (Stephen Gaukroger and John Cottingham), two articles on Spinoza (G.H.R. Parkinson and Hans W. Blom), one article on Gassendi’s and Hobbes’ materialism (Tom Sorell), one article on occasionalism (Daisie Radner), and one article on Leibniz (Nicholas Jolley). While the eight articles on seventeenth-century philosophers are almost all of a very high quality, the first three articles (which have to cover the remaining 250 years!) cannot be but cursory to the point of distortion. The index of names reflects this extraordinary bias: the most frequently cited authors are, in descending order, Descartes, Aristotle,

Leibniz, Gassendi, Hobbes, Aquinas, and Spinoza, while late Renaissance philosophers of the caliber of Tommaso Campanella or Julius Caesar Scaliger did not even make it into the index!

The same asymmetry appears also in the recent 10-volume Routledge Encyclopedia of Philosophy. While “Renaissance Philosophy” has once more a separate voice, there are no entries for either “Early Modern” or “Seventeenth-Century Philosophy.” By contrast, we may find an extensive voice called “Rationalism,” where both “Continental Rationalism” and “British Empiricism” are introduced. Once again, the editors quite evidently did not know what to say about the century as a whole and especially about its irrational first half, and the temptation to omit it by jumping from the Renaissance straight to Descartes’ mature work is everywhere too strong for resistance. A reader will, for example, find under the voice “atomism” David Sedley’s two columns on the Greek atomists, but no information about its early modern revival. The reader interested in “atomism in the seventeenth century” is instead asked to consult Margaret Osler’s piece on “Gassendi, Pierre.” The consequence of this editorial decision is, however, that the influential atomists of the first half of the century (Hill, Sennert, Basson, Gorlaeus, Galileo, Magnen, etc.) fall entirely through the cracks.

This procedure is not just a Routledge specialty. Kreimendahl’s Philosophy yields to the same temptation: after paying its obligatory tribute to Bacon, it jumps straight to the 1640’s and begins its portrait gallery of important philosophers there.

What is the reason behind this general aversion to the pre-Cartesian decades? It is presumably the observation that the philosophical landscape of that period looks extremely messy. On the one hand, we know from Charles Lohr that in terms of sheer numbers, more commentaries on Aristotle’s libri naturales were produced in the first half of the seventeenth century than in any other 50-year period before, Jesuits being responsible for a good percentage of that output (cf. Lohr 2001). But most historians have been reluctant to look at even the most interesting among these commentaries, taking them to represent the rearguard skirmishes of a losing school. On the other hand, the many non-Aristotelian philosophies appear equally inconsequential. While bristling with proposals of new philosophical systems, the first decades of the century produced none of lasting consequence. Instead, sects and systems proliferated without end. In his Systema of 1612, the young Johann Heinrich Alsted tried to reconcile no less than four systems of natural philosophy, namely i) Mosaic or Christian; ii) Cabbalistic; iii) Aristotelian; and iv) chemical. In 1646, Jean Chrysostome Magnen could think of so many philosophical “sects” that he felt he had to squeeze them into a tripartite scheme (pp. 28–29). Walter Charleton, who was acquainted with even more schools of thought than
Magnen, from whom he copied, squeezed them in 1654 into the four categories of "pedants," "assertors of philosophical liberty," "renovators," and "eclectics" (pp. 1–4). The period was teeming with self-appointed new Aristotles who tried to replace the old Peripatetic system by more modern, better, and often more Christian ones. To capture the aspirations of some of these new Aristotles, it suffices to cite Geoffroy Chassins, whose De natura of 1614 was introduced by a poetaster, a former lieutenant general, with the following words:

But now his [= Aristotle’s] fatal hour has come,  
To end his great felicity;  
His name and his authority  
Lie all destroyed, a ruined tomb.  
I see him naked and cast down  
Chassins has quenched his glorious name,  
And now the trophy’s palm of fame  
Belongs to France, as our crown.5

Now, the trophy did end up in France’s hands, not thanks to Chassins, but thanks to Descartes, the only successful philosophical messiah, who indeed managed to persuade a good number of contemporaries that his alternative system was coherent, fairly complete, and seemingly more capable of explaining those natural phenomena that fascinated the scientific avant-garde of his time. Irrespective of what we think about Descartes’ debt to earlier philosophers, it remains a fact that his method of radical doubt, his deduction of all of metaphysics and physics from first principles, and his complete unwillingness to refer to previous authors or texts provided a kind of tabula rasa situation that no previous author had managed to provide. With Descartes in hand, any reader could then, and still can, begin to philosophize afresh without needing to know about the doctrines of any previous auctoritates. It is for this reason that even today, introductory philosophy courses tend to begin with the Méditations. But the evident pedagogical and epistemological advantage of following Descartes’ instructions and of beginning the enterprise of philosophy with that all-cleansing Cartesian doubt leads to the problem with which we have begun: Descartes’ radical doubt also erases the memory of predecessors and contemporaries. This, it would seem, is the reason why some his-

5. Chassins (1614, s.p.): Ode de Jean Godard Parisien, cy-devant Lieutenant General au Baillage de Rheinmont, Sur les livres de Philosophie de Monseigneur Chassins: “[...]/Mais luy voicy l’heure fatale/Qu’ôte tranche sa felicité/ Son nom & son autorité/ Tombent en ruine totale./ Vaincu & nud il l’appercevoit/ Chassins a sa gloire estouffée,/ Et la palme de son trophée/ Sert de laurier à nos François.[...].]"
torsians of philosophy find it so hard to impose law and order on the decades preceding Descartes’ rationalist system.

Historians of science, by contrast, do not have to face this particular problem, not even those who believe in the historical reality of a Scientific Revolution with all its incommensurabilities and gestalt switches. There are three reasons for this. First, not even the most elementary survey of seventeenth-century science can afford to leave out figures such as Kepler, Galileo, or Harvey, which explains why the early decades of the century are always well represented. Second, there exists in the historiography of science no single figure that provides a tabula rasa situation comparable to the one provided by Descartes for the fields of metaphysics and epistemology. Even Galileo, who comes closest to being Descartes’ equivalent in the domain of science, cannot be analyzed without reference to others such as Copernicus, Kepler, Tartaglia, del Monte, or Sarpi. And third, our modern conception of science as a collective enterprise based on trial-and-error procedures, conjectures, and refutations weakens the interest in closed systems on the part of historians of science, who tend to contextualize system-builders such as Newton or Descartes, take an interest in unsystematic providers of crucial data such as Torricelli, von Guericke, or van Leeuwenhoek, and even study such evident still-births as Giordano Bruno’s mathematics or Robert Fludd’s astrology.

What to do with the professionals, that retrograde majority of philosophers?

While the first embarrassment is of a chronological and conceptual order, the second is of a social and geographical nature. It resides in the fact that, numerically speaking, the overwhelming number of professional seventeenth-century philosophers were university professors who taught philosophy according to the inherited scholastic models, while, conversely, almost none of the celebrated heroes of seventeenth-century philosophy ever taught at a university: they were Lord Chancellors, private tutors, lawyers, or courtiers. The question is thus: is it legitimate for historians of philosophy to go about their business ignoring all salaried, professional philosophers, and to do this without saying a word about it?

The frequent neglect of school philosophy, while conspicuous all by itself, leads to a second injustice: it obliterates from our historical memory all those places where the expression of free gentlemanly thought was limited by ecclesiastical control and “philosophy” could therefore only mean “school philosophy.” In other words, the almost exclusive interest of historians of seventeenth-century philosophy in extramural anti-Aristotelianism means that there is nothing to report from Spain, Portugal, Italy, and Eastern Europe. The history of “philosophy” thus becomes
the history of some gentlemanly circles in residential cities of northwestern Europe.

A comparison between Kreimendahl’s *Philosophen des 17. Jahrhunderts* and the preceding volume in the same series, Paul Richard Blum’s *Philosophen der Renaissance*, shows this double shift with utmost clarity. The volume edited by Blum contains the portraits of twenty-one philosophers, of which eleven are Italians, three Byzantine Greeks, three Germans, two Spaniards, and two French. A good number of them were eminent university philosophers, e.g., Pomponazzi, Melanchthon, Zabarella, Patrizi, or Suárez. In the subsequent volume, Kreimendahl’s *Philosophen des 17. Jahrhunderts*, the Mediterranean and East European worlds have completely evaporated, and with them all university philosophy. We read about Bacon, Hobbes, Descartes, Locke, von Pufendorf, Spinoza, Malebranche, Newton, Leibniz, Bayle, and Thomasius: the philosophical cosmos has shrunk to that small piece of Europe that lies between the corner points of London, Amsterdam, Paris, and Hanover. Moreover, despite a proliferation of institutions of higher learning all over Europe, we hear only about private philosophers. What it was that students of philosophy in the seventeenth century actually learnt at those numerous European universities between Uppsala, Palermo, Dorpat, and Coimbra remains a complete mystery.

Such omissions are not due to an absence of suitable scholarship. Studies on seventeenth-century Aristotelianism and its developments do exist, as do studies on how school philosophy is related to the genesis of both the new philosophy and science. As Dennis Des Chene’s *Physiologia* (1996) has recently shown anew with great clarity, the same type of

6. Blum (1999). The philosophers are: Ramon Lull; Georgios Gemistos Plethon; Georgios Trapezuntios; Cardinal Bessarion; Lorenzo Valla; Nicolaus Cusanus; Leon Battista Alberti; Giovanni Pico della Mirandola; Marsilio Ficino; Pietro Pomponazzi; Niccolò Macchiavelli; Agrippa von Nettesheim; Philipp Melanchthon; Petrus Ramus; Bernardino Telesio; Jacopo Zabarella; Michel de Montaigne; Francesco Patrizi; Giordano Bruno; Francisco Suárez.

7. Kreimendahl writes in his preface that Locke was a philosopher who no longer aimed with his doctrines at an audience of “professional (university) philosophers, but at the kind of philosophical layman who would lead a bourgeois life outside of the classical institutes of learning” (p. 7). But the same is of course already true for Francis Bacon, whose contempt for “professorial wisdom” Wolfgang Krohn mentions in his contribution to the same book (p. 33).

mise-en-relation can even be crafted between institutionalized philosophy teaching and Descartes’ new system. From a logical point of view, it is actually quite possible to defend Descartes’ traditional title of father of modern philosophy while at the same time liberating him from his heroic isolation. It suffices to separate Descartes’ impact from the historical embedding of his thinking, i.e., to separate Wirkungsgeschichte from Entstehungsgeschichte.

As for the historiography of science, it performs a comparable shift of interest away from Renaissance universities to seventeenth-century courts and societies and away from Italy across the Alps to the north-western part of Europe. For indeed, just like the “new philosophy,” the “new science” was the gentlemanly sport in which some free spirits engaged in those few places that could afford, encourage, or at least tolerate it. Though the pattern is thus analogous, the historians of science perform, as it were, a smaller jump. Although it is true that Spain and Portugal are generally faded out, with Iberians discussed only if they make an appearance further east (Estevaö Rodrigo de Castro in Florence, for example, or Juan Caramuel y Lobkowitz in Louvain or Naples), there is certainly no way of excluding Italy from the master narrative: Galileo and his school, the Accademia del Cimento, Redi or Malpighi are essential ingredients of the story. As for the traditional lack of interest in university education, the situation has been clearly changing over the past years. Notably the recent strong interest in the role of the Jesuits in the development and divulgation of physico-mathematical learning provides a powerful counterexample to the once popular idea that the institutionalization of modern science was a private Protestant affair. One of the side-effects of this increasing interest in the role of Jesuit teachers and institutions is that the relation between the extramural physica nova and the institutional philosophia vulgarius is turning into a matter of general interest.10

What to do with natural philosophy?
The third embarrassment has to do with meaning and reference. The simultaneous redefinition of philosophy and of science, often by the same gentlemen studiosi, takes us back to the problem of taxonomy. What are we to say of the activities and professional identities of these philosophico-scientific novatores? What is the implication of the fact that some of them, most famously Bacon, Descartes, or Leibniz, figure in the

9. Already Bohatec ([1912] 1966) has shown in how many respects the Cartesian system was in fact thought by contemporaries to resemble Aristotle’s.

10. Among the many important recent contributions, I will here only mention Dear (1995); Harris (1996); Hellyer (1998); Gorman (1998); Romano (1999).
narratives of both the history of science and of philosophy? Does this mean that the birth of modern science is philosophical or that the birth of modern philosophy is scientific, or that we have a few so-called polymaths engaged in two essentially separate enterprises? All three answers are obviously false as they stand. The truth lies, in this case, not in the middle, but hides behind the vexing problem of the nature of natural philosophy.

Historians of philosophy tend to avoid the taxonomic issue altogether, creating instead disciplinary continuities and discontinuities at will. In its introductory Chronology, for example, the Routledge History divides the exceptionally few dates it deems worthy of note in the period 1304 (the birth of Petrarch) to 1716 (the death of Leibniz) into four rubrics, which it labels “Politics,” “The Arts,” “Science and Technology,” and “Philosophy.” But why is Petrarch a “philosopher” (at the expense of Ockham or Wyclif, who are too unimportant even to be mentioned)? What makes Cardano and Galileo fall into the rubric of “scientists,” rather than into the category of “philosophers” like Agrippa von Nettesheim? Why does Bacon figure in one instance in the “Arts” section, but in all others in the rubric of “Philosophy”? And what does it mean if the Chronology of fourteenth-century philosophy prefaced to the fourth volume of the Routledge History does not show even the slightest overlap with the Chronology found in the third volume (Medieval Philosophy, cf. Blom 1998)?

Whatever methodological convenience there may be found in the separation of “philosophy” and “science,” it becomes a laughable farce when reduced to such accidental heaps of dates. It carries to a new extreme the old habit of ignoring Galileo Galilei’s title of “court philosopher,” of calling him a “scientist,” and of limiting his contribution to philosophy to providing a historical footnote to John Locke’s distinction between primary and secondary qualities. George Molland cries out in vain from inside the Routledge cage, in which he has been locked up:

The inverted commas [around the word “philosophical”] are intended to emphasize that, for this period, to distinguish rigidly between philosophy and science would be grossly anachronistic, and add even more to the historiographical distortion introduced by the policy of selectivity (Routledge History, p. 104).

The only way to avoid the production of histories of seventeenth-century philosophy in which all occurrences of the words “philosophical” and “scientific” must be corseted by inverted commas is to define the status of natural philosophy, which, after all, provided the platform for the extension of philosophy into the domains we now call science. It is commonplace—or should be one—that numerous scientific works defined them-
selves as contributions to “natural philosophy.” It is maybe not well known that the category of “natural philosophy” continued to be used in the world of Latin education long after Newton's *Principia mathematica philosophiae naturalis* and right up to our own century: Roger Joseph Boscovich’s *Theoria philosophiae naturalis redacta ad unicum legem virium in natura existentium* (1763), Marinus Johannes Cop’s *Oratio de botanicae cum ceteris philosophiae naturalis partibus, in primis cum chemia, necesitum* (1842), or Jules de La Vaissière’s *Cursus philosophiae naturalis* (1912) are but some examples.

The recent joust between Andrew Cunningham and Edward Grant over the nature of natural philosophy points to a fairly dramatic lack of sound and uncontroversial scholarship on the nature of natural philosophy in the early modern period. But indeed, the most innovative of early modern physicians, chemists, and physicists defined themselves as “philosophers” or called by the name of “experimental philosophy” what historians of science prefer to call simply “science.” The challenge is therefore to do justice to this “philosophical” aspect of seventeenth-century “science” and to the apparently “scientific” aspect of seventeenth-century “philosophy,” without losing out of sight either our own taxonomy nor the seventeenth century’s.

The task is difficult, but it can be done, as Helmut Holzhey’s masterly opening contribution to the new *Ueberweg* on “The Philosopher in the Seventeenth Century” shows. As Holzhey beautifully documents, the taxonomic problem troubles not only us, but vexed already the very seventeenth century. The ever less congruous social, methodological, and disciplinary nature of philosophy provoked an increasingly intense discussion over the role and objective of the philosopher, producing a range of conflicting definitions of his role and his tasks. Of particular interest in the present context is the way in which the practitioners of the new sciences defined themselves or were defined by others. The premise of all discussions was that the genus “philosophy” became distributed over an ever greater number of disciplinary sub-species. Experimentalists in the Baconian tradition were happy to define themselves as “Experimental Philosophers,” and Leibniz had no qualms about speaking of “philosophi mechanici,” “philosophi experimentales,” and “philosophi exactiores.” Antoine Furetière’s *Dictionnaire Universel* of 1690, in turn, stated that

11. Cunningham (2000) vs. Grant (2000). The starting point of the polemic are Cunningham (1991) and French and Cunningham (1996), who maintained that natural philosophy was a God-oriented discipline from the thirteenth century up to and beyond Newton. In his attack, Grant (1999) insists on the separation of domains between theology and natural philosophy from the Middle Ages onward.
“Philosophe, se dit particulièrement des Chimistes, qui s’appliquent se nom par preference à tous les autres” (Holzhey in Uberweg, pp. 7; 17–18).

But not everyone was happy to accept experimental science as a natural part and extension of the old philosophia naturalis or physica. Some university philosophers insisted on the separation between the merely speculative concerns of true philosophy, which aimed at cognitive certainty and stood in a clear propedeutic relation to the higher university faculties, on the one hand, and the experimental, applied, probabilistic, or utilitarian activities of the pseudo-philosophers, on the other hand. Some vernacular languages had a way of defining these differences: in seventeenth-century France, for example, “sagesse” (wisdom), the real aim of philosophy, was sometimes opposed to the special interests of “science.” Nor was this desire to keep the domains apart unilateral. Some experimentalists preferred other names—e.g., “novator”—to the title of “philosophus,” which they associated with Aristotle, “the Philosopher” tout court.

If the entire seventeenth century had spoken French and had espoused the distinction between a “science des novateurs” and the “sagesse des philosophes,” the problem would be less complex. But first, the Latin discipline of philosophia naturalis continued to be taught at the universities and slowly began to absorb some of the concepts and methods of the mathematical and experimental disciplines. Second, not all languages had a vernacular equivalent of “science,” and none of them possessed the word “scientist,” the result being that even the French or Italian practitioners of “science” or “scienza” were not for that reason “scientifiques” or “scienziati,” as they would be today. Despite his Due nuove scienze, Galilei was thus doomed to remain either a “filosofo” or a “matematico,” two titles that are inadequate from our point of view. The same holds true for the members of the French Académie des Sciences, whose organ, the Journal des Sçavans, offers us yet another professional definition. An “homme savant,” as Holzhey explains, was often seen in opposition to the “pédant”—or to the “homme docte,” which was a nice way of saying the same—a person, in other words, who was merely repeating the “doctrines” with which he had been spoonfed in the schools (Holzhey, pp. 13–14).

But while the French practitioners of “science” were “sçavans,” the members of England’s Royal Society published their findings in the Philosophical Transactions. Again, we can see that on the other side of the Channel, experimentalists did not dislike the title of “philosopher” as much as the French did. Although the word “science” existed much earlier, the professional description “scientist” is in fact only a nineteenth-century coinage. German, finally, never produced an analogous neologism for “sci-
ence.” Instead, it kept the old-fashioned term “Wissenschaft,” which covers not only the sciences, but also the arts.

It is obvious that these disparate linguistic developments render the tracing of disciplinary continuities and discontinuities a very delicate matter. Holzhey cites, however, a letter by Henry Oldenburg to Baruch de Spinoza, in which Oldenburg carefully distinguishes between those philosophers who experiment and observe, and those who seek the principles of all things (Holzhey, p. 17). In 1713, only a few decades later, Christian Wolff defined the philosopher as someone “who can give the reason of those things that are or could be.”12 Although the renewed expulsion of experimental, observational, and mathematical procedures from the realm of philosophy turned out to be a drawn-out process, Wolff’s definition anticipates our modern understanding of philosophy as a discipline dealing with the preconditions of the world, the logical coherence of what we say about it, and the ethical implications of our actions in it. But in order to do justice to the seventeenth century, we must not follow Wolff, but Oldenburg. To do otherwise is—as we have repeatedly stated—to limit one’s narrative to a series of north European gentlemen who were not appointed philosophers and occupied a mere niche within the extraordinary latitude of forms of seventeenth-century philosophy.

Two New Surveys
In the following, I propose to take a look at two recent surveys in the history of seventeenth-century philosophy, the Cambridge History of Seventeenth-Century Philosophy and the Ueberweg’s new Philosophie des 17. Jahrhunderts, and to examine them in the light of the three problem areas just described. As for volume IV of the Routledge History (“The Renaissance and Seventeenth-Century Rationalism”), published in 1993, it needs no further reviews; by trying to summarize 350 years of philosophical high-points, it also falls outside the strictly seventeenth-century boundary to which this article limits itself. The second reason also holds true of the new Routledge Encyclopedia. As for the eleven portraits contained in the Philosophen des 17. Jahrhunderts, edited by Kreimendahl, it would be unfair to compare such a little book with such heavily sponsored encyclopedic works as the eight-volume Ueberweg and the two-volume Cambridge History.13 Suffice it to say that the Philosophen, though handy and for the most part competently written, bears all too strongly the double imprint of

12. “Philosophus est, qui rationem reddere potest eorum, quae sunt, vel esse possunt” (Quoted from Holzhey in Ueberweg 1/1, p. 7).
13. The Ueberweg was supported by the Swiss National Foundation and the Cambridge History by the National Endowment for the Humanities (NEH).
Germano-centric editorial choices and of the old veneration for the Cartesian birth of modern philosophy.\textsuperscript{14}

To anticipate the conclusion of the evaluation of the \textit{Ueberweg} and the \textit{Cambridge History}, the verdict will be that the two works are complementary, and that they must both stand on the shelf of any self-respecting historian of seventeenth-century science and philosophy. As for the \textit{Cambridge History}, its two volumes are the extraordinary result of twenty years of hard work and excellent editorial craftsmanship. Many of the 36 essays it contains are veritable highpoints in the historiography of early modern philosophy and science. However, the work as a whole shows the traditional slant towards the Anglo-American canon “from Descartes to Locke.” As we shall see in detail, the \textit{Cambridge History} does not manage to cover the century evenly and in fact omits various philosophical and scientific traditions and entire geographical areas. To compensate these deficiencies, we need the \textit{Ueberweg}. Its eight volumes are divided up according to regions and thus retrace even the philosophical developments of Spain, Portugal, Italy, and Eastern Europe. With its 320 biographies, complete lists of primary editions, and commented secondary bibliographies, the \textit{Ueberweg} is destined to remain a reference work for historians of both philosophy and science for years to come. Its strongly structured and fragmented appearance in fact captures the fragmented nature of philosophical activity in the seventeenth century better than any previous publication. Despite its traditional appearance, the new \textit{Ueberweg} is therefore in truth a revolutionary product.

\textbf{The Cambridge History of Seventeenth-Century Philosophy}

The \textit{Cambridge History} is a highly admirable achievement. As the Preface explains, the project began in 1982 with a first outline made by Michael Ayers (Wadham College, Oxford) and got off the ground with the double appointment, a year later, of both Ayers and Daniel Garber (University of Chicago) as co-editor. The impressive result of what the editors call their “somewhat utopian scheme” and the astonishing coherence of the two volumes—due to Garber and Ayer’s “interventionist editorial rôle”—show that the sixteen years that separate the first draft from the date of publication were not passed idly (pp. xi-xiii).

\textsuperscript{14} The choice to limit the number of portraits to eleven (half the number of the portraits offered in Blum’s \textit{Renaissance} volume, 1999) is already risky enough. Some of the choices are furthermore inexplicable. Why dedicate the longest article to a rehabilitation of Samuel von Pufendorf? Kreindel’s introduction (p. 13) rightly mentions Hugo Grotius as the “founder of the modern natural law” and speaks of Pufendorf merely as someone who continued and enlarged that enterprise. But then, why choose Pufendorf over Grotius?
The two volumes are divided into 36 chapters, which in turn are organized according to the following thematic sections: Volume I contains 1) The context of seventeenth-century philosophy; 2) Logic, language, and abstract objects; 3) God; 4) Body and the physical world; 5) Spirit. Volume II contains: 6) The understanding; 7) Will, action, and moral philosophy.

The Introduction explains that “when the book was originally planned, the editors shared the view that some movement was badly need, with respect to the teaching of ‘history of philosophy’ in philosophy departments, towards a more historical approach to early modern philosophy.” It was not only necessary to provide the historical setting for the canonized works of the seventeenth century—the editors mention Descartes’ *Méditations*, Spinoza’s *Ethica*, and Locke’s *Essay concerning Human Understanding*—but also to discuss some forgotten authors such as Kenelm Digby, Pierre Gassendi, and Nicolas Malebranche, “who were giants to their contemporaries” (p. 3). The 36 contributions to the *Cambridge History* manage to satisfy both requirements. It was the editors’ explicit aim to “demonstrate by example that the historical and the philosophical understanding of a text are not as separable as philosophers have often seemed [. . .] to have supposed” (p. 4). Given the exceptionally high level of both analysis and contextualization offered in the chapters of this work, we may say that they have managed to realize their objectives.

However, the editors’ list of continuously famous and unjustly forgotten philosophers is telling. We are here once more in the presence of that traditional preference for the second half of the century and Europe’s north-western corner, as a glance at the most frequently mentioned authors quickly confirms: they are, in descending order, 1) Descartes, 2) Leibniz, 3) Hobbes, 4) Locke, 5) Aristotle, 6) Spinoza, 7) Gassendi, 8) Malebranche, 9) Thomas Aquinas, 10) Arnaud, 11) Newton, and 12) Mersenne. The *Cambridge History* is a formidable guide to the historical setting and genesis of the canonical works; it also manages to give a new life to a number of forgotten “giants.” But it certainly falls short of doing justice to the century as a whole, or to the entire “Europe West of the Elbe” which it seems to take as its geographical range (p. 9). Southern Europe is once more marginalized, one of the more prominent victims of this bias being the fascinating Giovanni Alfonso Borelli—certainly also a “giant to his contemporaries”—who in the two volumes makes but a fleeting appearance in two long lists of mechanical philosophers (pp. 671, 673).

However, this undeniable slant towards the Anglo-Saxon philosophical canon neither determines the nature of all articles nor invalidates the contents of this formidable collection of essays, some of which in fact deserve to be mentioned specifically. The *Cambridge History* begins with a short
chapter by Richard Tuck on “The Institutional Setting” (pp. 9–32). The essay has the great advantage of beginning with hard figures: Western Europe had about 60 million inhabitants in 1600, and Italy and the Netherlands were its most densely populated and affluent areas (p. 9). The author then makes the important observation that “after the Renaissance, philosophy became more of a young man’s activity than had hitherto been the case” (p. 17), with boys entering college at age ten or so and finishing their studies at about the age of eighteen—“in marked contrast to the mediaeval pattern, which would not have allowed them to take their M.A. until their late twenties” (p. 19). But what do boys with an M.A. in the arts do? Tuck, who worries over the career prospects of graduates, finds that “the most interesting” philosophers found secretarial or private tutorial appointments. The poverty of Spanish intellectual life must thus be due to the fact that there were no comparable jobs for philosophers or other literary figures. This analysis has much intuitive appeal, although it has a bizarre consequence: if the necessary precondition for being an “interesting thinker” and a “great seventeenth-century philosopher” (p. 14) is being employed outside of the universities or the teaching orders (both of which continued to employ bright young men, even when Spanish), then one wonders why Tuck ever got interested in writing a chapter on the “institutional setting” of seventeenth-century philosophy. “The non-institutional milieu of the self-appointed nouveaux philosophes” would have been a more appropriate title.

Stephen Menn’s lucid chapter on “The Intellectual Setting” (pp. 33–86) gives us a good idea of why the seventeenth century was yearning for a new philosophy. Menn writes that

People produced such new philosophies because there was a demand for a new philosophy, that is, a current expectation of what a philosophy should do, and a sentiment that the old philosophy was not doing it properly. Indeed, one may say that the chief philosophical legacy which the sixteenth century bequeathed to the seventeenth was not any particular new philosophy but this expectation of a new philosophy (p. 34).

Menn takes the reader through the various reasons that had led sixteenth-century thinkers to become wary of Aristotle, and he states, rightly I think, that “by the early seventeenth century, there were far too many

15. But not all of Tuck’s hard figures look convincing. The claim (p. 12) that “only two [philosophers] came from an unimpeachably upper-class background” (i.e., Descartes and Boyle) sounds decidedly false. Much more convincing is Holzhey’s calculation, based on 320 vitae, that about 20% of all seventeenth-century philosophers were aristocrats.
new philosophies available: the problem was to find a single good one” (p. 69). He observes with great acuteness that new observations were often only invoked as a pretext for legitimating entire new philosophies: Hobbes took Harvey’s discovery of the circulation of blood to prove that all life was motion, and Gilbert moved swiftly from his magnetic observations to “a new physics” and then to “a magnetic philosophy” (pp. 72–73). Menn’s essay is excellent, though it depends in a rather essentialist manner on the antithetical pair “school philosophy” vs “corpuscularian”, or ‘mechanical’, philosophy.”

D. E. Mungello’s chapter, entitled “European Philosophical Responses to Non-European Culture: China” (pp. 87–100), is a paradigm example for why one should jointly use the Cambridge History and the Ueberweg. While the Ueberweg offers the reader a long and carefully annotated bibliography of early modern writings dealing with Chinese philosophy and religion, the chapter as a whole lies like a shapeless monolith in Ueberweg’s introductory section. Mungello’s article, by contrast, manages to link the Jesuit literature on Chinese philosophy to its European readers, tracing its influence in particular to Sir William Temple (“Heroic Virtue”) and on Leibniz (“Novissima Sinica”) and discussing the problem Chinese history presented for Archbishop Usher’s chronology of post-diluvian world as well as for the discussion of Adamitic languages (pp. 90–92).

Gabriel Nuchelmans’ three chapters on aspects of seventeenth-century logic must be mentioned for the pioneering feat they represent (pp. 101–146). As the author repeatedly states, logic is one of the most neglected areas of seventeenth-century philosophy. In fact, despite the oft-voiced dislike of formal logic in general and syllogistic reasoning in particular, important work continued to be done in the domain of logic, much of which is here presented for the first time.

In his excellent chapter on “Method and the Study of Nature” (pp. 147–177), Peter Dear sides with those who deny that the alleged Scientific Revolution had to do with the discovery of any one single method. Instead of looking for the development of some specific methodology, Dear prefers to trace the function of the word “method” in the seventeenth century. He begins by distinguishing two different traditions in the early modern methods debate, first, a humanist pedagogical tradition in which “method” designated the proper presentation of disciplines; second, a specific set of resolute and composite techniques for discovering the principles necessary for the generation of scientific syllogisms. Furthermore, Dear looks specifically at Bacon’s dislike of syllogistic methods. In his Advancement of Learning (1605), Bacon had stated that “Logic doth not pretend to invent sciences, or the axioms of sciences, but passeth it over with a cuique in sua arte credendum.” Instead, the Lord Chancellor proposed a
method of discovery (which Dear defines as “essentialist operationalism”). Descartes, unlike Bacon, was not repelled by the historical baggage of the debate over “method,” but Dear casts doubt not only on Descartes’ fidelity to his own methodological rules, but also on their brilliance, siding rather with Leibniz who parodied Descartes’ method as “Take what is necessary, do as you ought, and you will get what you wanted.” Dear himself attacks the “unjustified assumption that Descartes’s method was an instrumentally efficacious technique by which he arrived at his results” (p. 159). Interestingly enough, Dear finds Descartes to resemble Bacon more than their different vocabularies might have made us assume:

The plausibility of the universal method had always rested on the lattice-work model of the unity of knowledge, and that lattice-work derived its potency from the assumption that it mapped onto the structure of the world itself—that it was, literally an essentialist map of the nature of things. “Method” and encyclopaedism, “method” and essentialism, connected together closely in the seventeenth century. In that respect, Descartes is unremarkable and compares with Bacon who is at first sight so different (p. 160).

Non-essentialist models of knowledge (sceptics, probabilists, etc.), by contrast, had no such obsession with method: “Mersenne never dealt with method” (p. 162). Dear’s masterly essay, which ends with a discussion of Newton, is a joy to read.

Martha Bolton’s chapter on “Universals, Essences, and Abstract Entities” (pp. 178–211) follows the Routledge scheme of jumping from the medieval and Renaissance cosmos of Aristotle, Thomas Aquinas, Ockham, and Ficino straight to Descartes, Hobbes, Gassendi, Cudworth, Locke, and Leibniz. Though Bolton offers a very illuminating and thorough discussion of some of the canonical works of the later seventeenth century, she ignores the fact that the powerful combination of atomism and nominalism was not brought about by Gassendi, but can be found in a series of the late sixteenth- and early seventeenth-century authors. An exemplary figure is Joachim Jungius who, in a reflection on the ancient atomists’ reduction of sensory qualities to the geometrical qualities of particles concluded, in 1630, that “Democritus was thus an Occamist.”

Several other chapters yield to the same temptation of jumping from the Middle Ages to Descartes. One of them is by Nicholas Jolley, who discusses “The Relation between Theology and Philosophy” (pp. 363–392). Jolley’s discussion, which focuses on Descartes and his followers, would be historically much richer if it included references to the background of

16. Quoted from Wohlwill (1886, p. 23).
Descartes’ position. Theo Verbeek’s *Querelle d’Utrecht* (1988), for example, shows how theologians such as Gisbert Voetius understood Descartes’ philosophy in terms of much older (heretical) doctrines. The same is particularly true for the debate over transubstantiation. Jolley writes as if this debate belonged to the middle of the seventeenth century, while the chief positions had in fact been defined in the sixteenth on the basis of medieval authorities. Finally, the categories of “Radical Protestants” and “mainstream Protestants” do not really seem to do justice to the plethora of non-Catholic Christian churches and the hair-splitting differences in sacramental doctrine that separated them.

Almost the opposite may be said of Richard Popkin’s chapter on “The Religious Background of Seventeenth-Century Philosophy” (pp. 393–422). This reads like a summa of Popkin’s collected works condensed into a short and exceptionally erudite essay which everywhere conveys the feeling that things were always much more complicated than could possibly be explained in a few pages. Surprisingly, however, Popkin’s dense tour d’horizon is not always reliable, the most obvious blunder consisting in the assertion that Bruno’s *Spaccio de la bestia trionfante* was first published in the eighteenth century by Toland (p. 415). As the inquisitional acts of Bruno’s trial show, it would certainly have been much better for its author if the *Spaccio* had remained unpublished; but alas, it had come out in London in 1584.17

The heavy emphasis of various articles18 on Descartes *cum segnacibus* is counterbalanced by Roger Ariew and Alan Gabbey’s knowledgeable chapter on “Body and the Physical World” (pp. 425–453), which traces the development of ideas on physical bodies from the Coimbra Commentators and Bartholomaeus Keckermann to Ariew’s personal favorites, Scipion Duplex and Eustachius a Sancto Paulo and to the philosophers of the mid-century. Equally smooth is the historical trajectory described in Brian Copenhaver’s chapter on “The Occult Tradition and Its Critics” (pp. 454–512), which covers “magic, astrology, alchemy, demonology, divination, kabbalah, witchcraft, spiritualism, and kindred beliefs” from Della Porta to the end of the seventeenth century. Copenhaver takes a very useful comparative approach to this intrinsically messy subject, choosing three authors of very different philosophical persuasions who published major works in the time period 1616–1622: "Burgersdijk, Campanella, and Fludd showed their century three ways to befriend occultism”

18. Notably Jean-Luc Marion, “The Idea of God” (pp. 265–304); Thomas M. Lennon, “The Cartesian Dialectic of Creation” (pp. 331–362); Charles McCracken’s “Knowledge of the Existence of Body” (pp. 624–648).
After discussing the views of occult qualities of a number of influential thinkers from Mersenne up to Leibniz, Copenhagen arrives at Berkeley’s note of 1707/08: “Anima mundi. Substantial Forms. Omnipresent radical Heat. Plastic vertue. Hylarchic principle. All these vanish” (p. 502). Although this sounds like the end of occultism, Copenhagen’s chapter does not end there. Leibniz, so he argues, gave occultism a new chance with his “sympathetic harmonies and living monads,” despite the simultaneous attack on Newton’s gravity for being “inexplicable, unintelligible, precarious, groundless and unexamined, [...] a chimerical thing, a scholastic occult quality” (Leibniz to Samuel Clarke, 1716, quoted ibid., p. 503).

Steven Nadler’s “Doctrines of Explanation in Late Scholasticism and in the Mechanical Philosophy” (pp. 513–552) is a highly useful systematization of seventeenth-century models of explanation, although it systematizes maybe a trifle too eagerly. Nadler writes, for example, that “two assumptions about the physical world underlie mechanical explanations. First, it is assumed that nature is completely homogeneous in material [...] Second, nature is uniform in its operations” (p. 521). These two assumptions, if taken in a large sense, are also true for most Aristotelians, but if taken in a narrow sense, they are true only for a dwindling minority among mechanicist philosophers. Not everyone agreed with Boyle in supposing “one catholic or universal matter common to all bodies.” In fact, many corpuscularian mechanicists assumed that beyond their geometrical shapes, there were additional qualities and specific rules of behavior with which God had endowed certain types of particles at the moment of creation, an assumption that obviously undermines the notion strictu sensu of both the homogeneity of matter and the uniformity of natural operations.

The excellent chapter on “New Doctrines of Body and Its Powers, Place, and Space” (pp. 553–623) is the product of the team work by Daniel Garber, John Henry, Lynn Joy, and Alan Gabbey. With a great mastery of primary and even the most recent secondary literature on the topic of matter theory, the four authors explain the continuities and discontinuities between late Aristotelian hylemorphism and various early modern theories of matter. The only drawback of the article resides in the overly rigid division into Continental and English philosophy. Given that from Bruno and Hill up to Hobbes or Locke, Continental authors either went to England or, more often, the other way around, this division is hard to defend. In the present case, it has also led to strange distortions in the chronology and to unfortunate omissions (Bruno, Beeckman, van Helmont, and the entire alchemical tradition).
Alan Gabbey’s “New Doctrines of Motion” (pp. 649–679) begins with the acute observation that mechanical philosophers shared with an Aristotelian such as Keckermann the view that local motion was, from a causal point of view, the primary motion. Much of the article is dedicated to an analysis of what exactly was new about the “brand new science concerning a very old subject,” i.e., motion (Galileo’s words). Gabbey first takes us through the Aristotelian “fluxus formae” vs “forma fluens” discussion and then traces the evolution of Galileo’s concept of motion, showing in detail how his view of force changed to a “proto-postivist concern with only the mathematically expressed properties of uniform and accelerated motions” (p. 652). Isaac Beeckman, by contrast, is shown to have gone beyond mathematical qualities. As an underpinning for his assumption of inertial behavior, he invoked, for example, the principle of sufficient reason: unless there is a reason for stopping, a body will not stop. By contrast, Honoré Fabri and other Aristotelians felt that motion required a cause—an assumption that angered Descartes: why should one try to reduce motion to something else if motion was nothing beyond spatial “transference”? For Gabbey, one of the reasons for why the debate between Aristotelians and mechanical philosophers is particularly interesting is the “growing awareness of the existence of, and of the importance of solving, problems that had not been part of the regular Peripatetic programme in natural philosophy” (p. 670). The new “mathematical physics” was *terra incognita* and its pursuit was driven by hopes that were often not fulfilled. One of these unfulfilled dreams was to reduce all natural change to colliding bits of extended pieces of matter, a dream whose fulfillment would have required the discovery of suitable mathematical laws of collision.

Two more articles shall be mentioned here. J.R. Milton’s “Laws of Nature” (pp. 680–701) starts with the observation that in much of Greek philosophy, “nomos” (law) and “physis” (nature) are outright antithetical concepts, the assumption being that only rational creatures can stand under a law. Milton’s excellent chapter traces the way in which an essentially moral category merged with an essentially physical category in forming the concept of “law of nature.” Milton finds rare occurrences of the Latin word “lex” (law) to describe regularities in the field of optics from Roger Bacon up to Kepler, and in astronomy from Regiomontanus onward. But he rightly points out that these authors do not use the word in our modern sense. When Georg Joachim Rheticus praises Copernicus for having discovered “the laws of astronomy” (*leges astronomiae*), we must not forget that “there are no laws as we understand them in *De Revolutionibus*” (p. 684). As was to be expected, the legal vocabulary of Francis Bacon plays a role in the popularization of the concept. But for Bacon, “law” was connected to
“form,” not to quantity. Its mathematization is a process that is mainly due to later authors such as Descartes, Huygens, Leibniz, and Newton. But “by the close of the seventeenth century, the idea that the main objective of natural philosophy lay in the discovery of laws of nature had triumphed” (p. 692). But three questions were still left: i) In what way should these laws be regarded as necessary? ii) What part does God play in ordaining laws and governing the world? iii) Is it possible to discover these laws otherwise than through observation and experiment? (p. 693).

Finally, Michael Mahoney’s “The Mathematical Realm of Nature” (pp. 702–755) deserves to be singled out for praise. It investigates the changing relations of mechanics, mathematics, and metaphysics. Everyone knows of Galileo’s belief that the book of nature “is written in the language of mathematics, and [that] its characters are triangles, circles, and other geometrical figures” (p. 703). Mahoney is particularly interested in the gradual transformation of this purely geometrical understanding of nature into a symbolic algebra: at the end of the century, one had arrived at the merely “hidden geometry” of infinitesimal analysis and a “new calculus of transcendentals” (Leibniz’ terms; ibid., p. 704). In telling his complex story, Mahoney insists, rightly, I think, on the mutual interdependence of the new philosophy and the new mathematics: they furthered each other’s development, the two main threads being the new science of mechanics and the development of algebraic analysis. The only deplorable aspect of this chapter consists in the horridly scanned and ineptly reproduced mathematical diagrams and representations. They are worthy of a boy Scout magazine, but certainly not of an expensive classic-to-be.

In this short survey of a number of chapters, I have attempted to do justice neither to the contents of the Cambridge History as a whole nor even to its most interesting aspects. The selection was much rather the result of two criteria: first, the presumed relevance of certain chapters to the readership of Perspectives on Science, and second, their relation to the problem areas defined in the first part of this review essay. Aside from its slant towards Descartes and the consequences, it is beyond doubt that the Cambridge History is a masterpiece from a scholarly and an editorial point of view. The clear and detailed portrait it offers of seventeenth-century philosophy will not easily be surpassed for years to come.

Ueberweg’s new “Philosophie des 17. Jahrhunderts”
The second publication to be discussed here is the new history of seventeenth-century philosophy published under the traditional name of Ueberweg. Although only six of its eight volumes have so far appeared, it is already obvious that the new Ueberweg is of all existing philosophical sur-
vey works the largest, most thorough, and most ambitious in scope. Thanks to its bio-bibliographical structure, it will also prove to be the most useful to historians of both philosophy and science. The recent publication of the first, introductory volume permits a look at this enterprise also from a methodical point of view.

The *Überweg* takes its name from the nineteenth-century historian of philosophy Friedrich Ueberweg, whose *Grundriss der Geschichte der Philosophie* of 1866 was probably the best handbook of the history of philosophy of its time. After going through four different editions under the original editor (who died in 1871), the fifth edition of 1880 was prepared by new editors, but was published under the old name as *Friedrich Ueberwegs Grundriss der Geschichte der Philosophie*. In the course of the years, the *Grundriss* has grown steadily in size. What had originally just been a section in the one-volume part dedicated to the “third period of philosophy of the Christian era” is in the new *Überweg* nothing less than an eight-volume *œuvre* entirely dedicated to the seventeenth century, with Jean-Pierre Schobinger (University of Zurich) as their general editor. Simultaneously, the publisher has moved from Berlin to the Schwabe Verlag in Basle, which had already produced the 1953 reprint of the twelfth and last edition of 1924. Given that the Schwabe Verlag is the direct heir of the humanist printers Petri (Officina Henricpetrina), Froben, and Amerbach, this choice seems particularly suitable.

The *Überweg* belongs to that genre of reference book that in German is called “Grundriss,” a term of architectural extraction which means literally “ground-plan.” This means concretely that the editors have followed the traditional compendium format, offering “a decidedly objective presentation of the most recent results of research in the history of philosophy and to present their subject matter, as was done previously, in a chronological and doxographic form and to offer a comprehensive survey over the primary and secondary literature.” Conscious of the high standards they had to meet, editors and authors have taken twenty years to write no less than 320 *vitae*, providing a complete annotated bibliography of all primary material produced by hundreds of authors, and providing as large a bibliography of secondary literature as was possible. Given the palpable success of these labors, the editor’s claim is justified: “The *Überweg* was rightly regarded as the standard bibliographical reference work in the history of philosophy. As far as the primary literature is concerned, the new edition fulfills this task in a historically unique manner” (p. lli).

Particularly interesting is Schobinger’s decision to add, as his new organizing principle, a geographical scheme. The resulting order of the volumes is thus:

vols. 1.1 and 1.2: General themes, Iberian Peninsula and Italy (published in 1998)

vols. 2.1 and 2.2: France and the Netherlands (published in 1993)

vols. 3.1 and 3.2: England (published in 1988)

vols. 4.1 and 4.2: Holy Roman Empire, Northern and Eastern Europe (in print).

The last edition of the Ueberweg, published in 1924 and reprinted in 1953, emphasized the work of Descartes, Hobbes, the Occasionalists, Spinoza, and Leibniz, and conveyed the idea that the seventeenth century was characterized by a philosophico-empirical search for new systems, was jointly carried out by the “common work of the erudite members of all nations.”21 Against the background of the confessional wars that lacerated the political and social landscape, the “République de Lettres” was celebrated as a harmonious, supra-national, and inter-confessional body. The editor and the authors of the new Ueberweg are, by contrast, under the opposite impression, writing that they have been struck by the vitriolic, aggressive, and controversial nature even of literary exchanges (p. xlv). At the same time, they also accuse those who reduce philosophy to a few great systematic minds of overlooking “the philosophical life of entire regions,” although they readily admit that this injustice has a long tradition which goes back at least to Johann Jakob Brucker’s Historia critica philosophica of 1742–1744.

The new Ueberweg wishes to combat and correct this view. One of the explicit editorial intentions was to disprove the essentialist notion that Descartes’ mathematical-scientific method represents the key to the understanding of the century (pp. xlv-xlvii). Seventeenth-century philosophy had—Schobinger writes—no single embodiment, no essence, no one typical mode of expression, and a vast array of different motivations (p. xliii). To the contrary, it flourished in new domains and extended its reach into unexpected directions and assumed many aspects that are traditionally “almost ignored in the history of philosophy,” as, for example,

school philosophy; theological themes such as casuistry, counter-reformational currents, Jansenism, Puritanism, Socinianism, mysticism; social phenomena such as circles, private academies

patronized by a prince or national academies, or political refuge; professional or lay authors with specific mono-disciplinary interests as, for example, physicians, mathematicians, physicists, experts in public law; literary-ideological or courtly themes such as libertinage or bonnété (pp. xlv-xlvi).

The dozens of authors who have collaborated to produce the new Ueberweg have followed the editorial instructions and have wonderfully managed to integrate all of these aspects into their discussions. As a result, the reader will find more and better information than ever before about the evolving world of seventeenth-century Aristotelian school philosophy and its relation to the extra-mural world of learning, about the evolution of various philosophical and scientific disciplines, about social, economic, and political aspects of seventeenth-century learning—and all of this not just for the usual cases of France and England, but also for Germany and Bohemia, Portugal, Spain, and Italy.

The nine general essays of volume 1/1 are intended to introduce these themes and to rectify traditional accounts of seventeenth-century philosophy. While most contributions are of the highest quality, a few are too short or anecdotal to provide more than an intuitive apperçu. Furthermore, the space granted to the various introductory essays does not always mirror their real importance.

Helmut Holzhey’s outstanding opening essay on “The philosopher in the seventeenth century” has already been discussed above. It is followed by Hans Bot’s essay on the “respublica litteraria,” which shows that the République des Lettres was more an ideal than a reality and at the same time sheds some light on academic structures, journals, and the printing press. However, it touches on too many important topics to do justice to all of them. The subsequent, short article on the use of Latin and the vernacular by Vilem Mudroch and Wolfgang Rother makes a number of important observations, notably concerning the continued relevance of Latin for the internationally operative monastic orders. The authors also show that the vernacular preferred by the new sciences was not only a bow before their practically oriented readership, but sometimes a gesture of rebellion against the perceived fossilization of the school vocabulary.

Peter Schultess’ long essay on philosophical discussions of method manages astonishingly well to bring order into a very unruly topic. “Method” is—not least in connection with Descartes’ Discours de la

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métode—frequently seen as the key to the understanding of both the new concerns of philosophy and the concomitant rise of science. But already in 1565, Adrianus Turnebus had complained that “method” was the most popular and frequent term used in philosophical discussions and that the term had assumed a variety of meanings.25 Schultheiss pays special attention to “the debate over method in mathematics and the natural sciences.” In particular, he analyses the new fashion of reasoning “more geometrico”; the late sixteenth-century and early seventeenth-century debate “de certitudine mathematicorum”; reductionist models in mechanistic and corpuscularian theories; induction; Bacon’s experimental attempts to find the secrets of the “natura vexata” and their relation to the “topica universalis”; the so-called Paduan method; Descartes’ methodological writings; and Newton’s “regulae philosophandi.” His approach in fact parallels and complements Peter Dear’s in the Cambridge History.

A less common topic is addressed in the disproportionately long and unnecessarily inflated contribution by Gianni Paganini on the “main tendencies of clandestine philosophy.”26 Paganini begins with the obvious observation that the counter-reformational situation and the establishment of the Index drove a lot of philosophers into an inner exile, which followed the Italian motto that though one’s heart was free, one’s public behavior had to follow common rules of conduct (“intus ut libet, foris ut moris est”). Whatever smelled of libertarianism, deism, and naturalism, let alone atheism, therefore circulated only in manuscript form and often anonymously, to rise to the surface only in the eighteenth and nineteenth centuries, if at all.

George MacDonald Ross’ essay deals with occult schools of thought. The author rightly observes that despite its rationalizing tendencies, the seventeenth century did not dispense with occult qualities and in fact often introduced them into otherwise reductionist corpuscularian models, one of the more famous cases being Kenelm Digby’s corpuscularian account of the effects of the weapon salve.27 The author, who distinguishes three types of magic, documents that towards the end of the century, belief in the effects of natural magic became a marginal phenomenon, while the belief in both spiritual and demonic magic continued in various forms. Equally useful are the author’s distinctions between various types of “Hermeticism.” Somewhat surprising is, by contrast, the author’s lack of

sophistication in his discussion of astrology. It cannot possibly be true that the last quarter of the seventeenth century reached a consensus regarding the scientific insufficiency of astrology (p. 210). Not only were even the Encyclopedists around Diderot and d’Alembert convinced of the importance of astrology for meteorology (1751), but at some universities (e.g., Bologna) astrology continued to form part of the medical curriculum up to the Napoleonic age.

A somewhat rare subject is addressed in Iso Kern’s long essay on the diffusion of reports on Chinese philosophy in Europe.28 Despite the intrinsic interest of this topic, this is possibly the oddest introductory piece, for it contains less than a page on the actual effects of Chinese philosophy on European minds, while dozens of pages are dedicated to a commented bibliography of mostly Jesuit writings on China. As stated earlier, this article is best read alongside Mungello’s chapter in the Cambridge History.

Much too short, by contrast, is Giovanni Santinello and Lucien Braun’s contribution on the “seventeenth-century historiography of philosophy,” which limits itself to some randomly selected examples and is therefore quite insufficient, particularly considering just how many of the typically seventeenth-century philosophical trends were avowed revivals of ancient schools of thought.29 The last introductory essay, by Stefan Ehrenberg, discusses the development of the historiography of seventeenth-century philosophy from the eighteenth century up to the first edition of the Ueberweg (1866).30

As for the rest—seven and a half volumes of very detailed entries and thus Ueberweg’s true treasure—it refrains from making generalizations, explicitly distances itself from labels (Neoplatonism, Stocism, etc.) and instead follows the editor’s belief that the philosophy of the seventeenth century must be represented in all its heterogeneity and in its regionalized nature (pp. xl-xl). The all-pervasive anti-essentialism of this reference work is enriching beyond description. It was probably inevitable that the Ueberweg would be incapable of squaring the circle by providing a tight introductory synopsis together with this plethora of material of unheard-of detail, but it comes closer to squaring this circle than any other available publication. As a reference work, it has established new standards and will remain unparalleled.

Conclusion

We must not forget how extraordinarily homogeneous all domains of human knowledge could still appear in a late sixteenth-century scholastic textbook, where tables of Ramist inspiration indicated how one discipline branched out of another, and where a shared vocabulary of potencies and act, essence and accident, and matter and form gave fields as distant as ethics, metaphysics, and physics an air of family resemblance. In the preface to his physics, the German philosopher Johannes Combach, who was ostensibly curious about, and open to, new trends and schools of thought, expressed in 1620 the hope that

one day someone will finally arise, who will show us more perfect principles, and gather into one certain system what Paracelsus and other teachers of truth have handed down here and there in scattered fashion, and deliver to us the order and connection of true physics.\(^{31}\)

Nothing shows more clearly the generally agreed-upon requirement that any new system would have to possess at least the same logical clarity and order as the one on which the entire pedagogical approach of European universities depended. Mere bits of empirical findings, however true and valid, would not be sufficient. A good portion of seventeenth-century natural philosophy is constituted by attempts to meet this challenge. It was a challenge that led not just to rivalling approaches and numerous new syntheses and systems, but also to an unprecedented expansion of the scope of natural philosophy.

In the end, the challenge was not met. Despite all attempts to prove the contrary, the success story of the modern scientific disciplines has been accompanied by the drama of increasing epistemological and ontological fragmentation. However coherent or incoherent splendid systems such as Descartes’ or Boreli’s may have been, which tried to explain everything from the acceleration of a falling stone to the workings of the human body, they represent merely a transitional period of self-deception. Their systems could not stop the increasing process of mutual disconnection of disciplinary fields and the multiplication of methodologies and ontologies. The chief legacy of the Aristotelian sub-conscience of seventeenth-century natural philosophers to subsequent centuries, including ours, is however

the idea of the unity of science, explanatory reductionism, and the dream of the mega-theory.

This is the reason why the drama of seventeenth-century philosophy will remain important to the understanding of our own epistemological situation for some time to come. To know the canonical authors will remain of importance to the systematic philosopher, who continues to draw inspiration from their texts, and to the cultivated reader alike. To the historian, however, the lessons to be drawn from the dozens of forgotten local struggles, with all their incompatible pedagogical, confessional, political, and social components, their pamphlet wars, their numerous misunderstandings, their exiled philosophers, and their missionary zeal and fury are at least equally illuminating.

References
Alsted, Johann Heinrich. 1612. Systema physicae harmonicae, quatuor libellis methodice propostum. Herborn: [n.p.].
Combach, Johann. 1620. Physicorum Libri IV. Marburg: Rudolph Hutwelcker.


