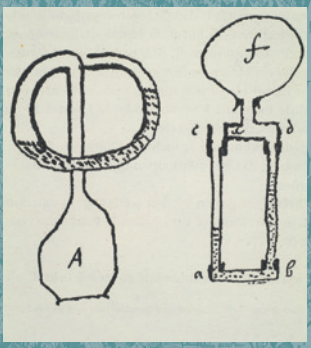
STUDIES IN THE HISTORY OF KNOWLEDGE

Edited by Klaas van Berkel, Albert Clement, and Arjan van Dixhoorn

Knowledge and Culture in the Early Dutch Republic

Isaac Beeckman in Context



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Cover illustration: Map of the city of Middelburg by Cornelis Goliath, 1657; Beeckman's drawing of two thermoscopes, from his *Journal*

Cover design: Coördesign, Leiden
Lay-out: Crius Group, Hulshout

ISBN 978 94 6372 253 7
e-ISBN 978 90 4855 147 7 (pdf)
DOI 10.5117/9789463722537
NUR 685

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A Note on Abbreviations

AT *Oeuvres de Descartes*, publiées par Charles Adam et Paul Tannery, 12 vols. (Paris: L. Cerf, 1897-1910). Nouvelle présentation in 13 vols., Paris: Vrin, 1974-1986

GW Johannes Kepler, *Gesammelte Werke*, ed. Walther von Dyck and Max Caspar, 22 vols. (Munich: Beck, 1937-2017)

JIB *Journal tenu par Isaac Beeckman de 1604 à 1634*, publié avec une introduction et des notes par C. de Waard, 4 vols. (The Hague: Martinus Nijhoff, 1939-1953)

ZAM Zeeuws Archief Middelburg

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Preface

In this volume we have brought together more than a dozen new studies about the Dutch natural philosopher Isaac Beeckman (1588-1637). Today, his important role in the initial stages of the Scientific Revolution of the seventeenth century is contested by no one, if only because of his decisive influence on the young René Descartes. Yet, the origins of Beeckman's innovative ideas about the constitution of the natural world and the mechanisms that lay behind natural phenomena deserve more historical investigation. Also, the social and cultural context in which he operated and which partly shaped his ideas and practices awaits further scrutiny. Moreover, his notebook and his particular way of philosophizing shed new light on the cultures of knowledge in the early seventeenth century, especially in the Dutch Republic. By exploring all these different issues, by extending the research into areas that were previously underexplored, and by re-thinking categories of thought that have been taken for granted for too long, we hope that this volume will contribute to a better and richer understanding of the early modern history of knowledge.

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1 Introduction

Klaas van Berkel, Albert Clement, and Arjan van Dixhoorn

In 1905, the discovery of the so-called *Journal* of Isaac Beeckman was a major event in the small community of historians of science in Europe.[1] The manuscript not only contained precious information about Beeckman's meeting with René Descartes in 1618 and their collaboration in deriving the law of falling bodies, but also copies of some unknown letters by Descartes to Beeckman, and an abundance of notes concerning various topics that were of interest to historians of the early modern period, such as the invention of the telescope, the principle of the conservation of movement, the refraction of light, the concept of air pressure and the corpuscular theory of matter in general. Although Beeckman had not been completely unknown before, from this point on his name became firmly entrenched in the grand narrative of what was soon to be called the Scientific Revolution of the seventeenth century. In his famous book *The Origins of Modern Science, 1300-1800* (first published in 1949), Herbert Butterfield refers to Beeckman as 'a man who stimulated others to take an interest in important problems and initiated a number of ideas', though without specifying what these ideas were. In *The Mechanization of the World Picture* (English translation 1961), E.J. Dijksterhuis devoted no less than five pages to Beeckman's work, focusing on his work, with Descartes, on the law of free-falling bodies. In the same vein, John Henry in his slim volume *The Scientific Revolution and the Origins of Modern Science* (second edition, 2002) pointed to Beeckman in the context of the mathematization of natural philosophy. Isaac Beeckman, he says, 'set an impressive example of how to use mathematics in physics'. In his more

1 Throughout this volume, we differentiate between the 'manuscript' or the 'notebook', which has as its title *Loci communes*, but certainly is not an example of that genre, and the *Journal*, that is Cornelis de Waard's edition of the manuscript: *Journal tenu par Isaac Beeckman de 1604 à 1634*, publié avec une introduction et des notes par C. de Waard, 4 vols. (The Hague: Martinus Nijhoff, 1939-1953) [henceforth *JIB*]. See the contribution by Van Berkel to this volume, 'Framing Beeckman'. The original notebook is now preserved in the Zeeuwse Bibliotheek, Middelburg, ms. nr. 6471.

Van Berkel, Klaas, Albert Clement, and Arjan van Dixhoorn (eds.), *Knowledge and Culture in the Early Dutch Republic: Isaac Beeckman in Context*. Amsterdam, Amsterdam University Press 2022
DOI: 10.5117/9789463722537_CH01

recent *The Invention of Science: A New History of the Scientific Revolution* (2015), David Wooton also mentions Beeckman regularly.[2]

Nonetheless, even though it would be incorrect to say that Beeckman has been neglected since his notebook was discovered more than a century ago, it is true that to this day the enormous richness of the *Journal* has not been fully exploited. Like Butterfield, Dijksterhuis only hints at the wealth of interesting topics discussed in Beeckman's notes by saying that although he did not publish his findings, Beeckman's ideas in his *Journal* are to be valued because they give the reader 'some notion of the scientific thought of a gifted man of the early seventeenth century'.[3] The way in which historians of science looked at Beeckman and his *Journal* was mostly determined by the somewhat narrow scope of the historians of science in the greater part of the twentieth century. They were mainly interested in the development of ideas that could be linked to modern science as we know it. Present-day historians of science have a much broader horizon than previous generations and take into account many more aspects of the early modern philosophers' and scholars' occupation with nature. This has resulted in the rise of the social history of science and the history of knowledge in the 1980s through 2000s. Our current understanding of Beeckman has profited greatly from this development. Reading and re-reading the *Journal* constantly offers new perspectives and brings to light new aspects of his life, his thinking and knowledge-making, as well as that of his immediate social surroundings.

Isaac Beeckman: A Brief Outline of His Life

Ever since the publication of Beeckman's *Journal*, the basic facts about his life have been well established.[4] He was born on 8 December 1588 in the city of Middelburg, capital of the province of Zeeland, one of the seven provinces

2 Herbert Butterfield, *The Origins of Modern Science, 1300-1800* (London: Bell and Sons, 1949), p. 71; E.J. Dijksterhuis, *The Mechanization of the World Picture*, trans. by C. Dikshoorn (Oxford: Oxford University Press, 1961), esp. pp. 329-333; John Henry, *The Scientific Revolution and the Origins of Modern Science* (Basingstoke: Houndsmill, 1997), p. 27; David Wootton, *The Invention of Science: A New History of the Scientific Revolution* (London: Allan Lane, 2015).

3 Dijksterhuis, *The Mechanization of the World Picture*, p. 330.

4 In the first volume of his edition of the *Journal*, published in 1939, De Waard included a 'Vie de l'auteur' that is still the basis of our knowledge of Beeckman's life. *JIB*, I, pp. i-xxiv. For a more extensive treatment of his life: Klaas van Berkel, *Isaac Beeckman on Matter and Motion: Mechanical Philosophy in the Making* (Baltimore: Johns Hopkins University Press, 2013), pp. 8-75.

that constituted the independent Dutch Republic that was just beginning to take shape after the Revolt against Habsburg rule. His father, Abraham Beeckman, was an immigrant from the city of Turnhout in Brabant, in the Southern Netherlands. As a child Abraham had fled his native city for the sake of religion (the Beeckman family had converted to Calvinism in the 1560s). First the family moved to London, but in 1585 Abraham settled in Middelburg, where he set up shop as a candle maker. In early 1588, he married Suzanna van Rhee, the daughter of another immigrant from the South. Isaac Beeckman was their first-born son. Their second child, baptized as Jacob, was born in 1590. Isaac Beeckman always remained very close to his younger brother.

Isaac went to primary school in Middelburg, but had to go to the nearby cities of Arnemuiden and Veere to get his secondary education at the Latin schools in those cities. This was due to a long-standing theological dispute of his father with local ministers in Middelburg, who controlled the local Latin Schools. In May 1607, at the age of eighteen, Isaac matriculated at Leiden University, where he studied theology and mathematics. His mentor in this respect was the well-known Ramist professor of mathematics Rudolph Snellius. During his time in Leiden, Beeckman started to record his ideas on a wide range of topics (mathematical, mechanical, natural philosophical, and in later days also medical) in a notebook that evolved into the *Journal* published by Cornelis de Waard. In August 1610 he left Leiden and returned to Middelburg, without having obtained a specific degree. This was not unusual for those who intended to become a minister in the Dutch Reformed Church, since the Church examined future ministers itself. Beeckman helped his father in his workshop and in 1611 established himself as a candle maker in the city of Zierikzee, also in the province of Zeeland. In order to add to his qualification to serve in the ministry, he went to the Huguenot academy at Saumur in 1612. A year later, he passed his exams for the Church, but then found it difficult to find a congregation, presumably because of his father's difficult relations with the Church in Middelburg. Thus Isaac settled for good as a candle maker in Zierikzee, or so it seemed.

In 1616 Beeckman again made a surprising career switch. He sold his shop, moved back to Middelburg and set out to study medicine, possibly with the help of books lent to him by a family friend, the minister, self-educated physician and astronomer Philippus Lansbergen. After two years of intensive study he travelled to the University of Caen in Normandy, where he took his doctoral degree on 6 September 1618, with a dissertation entitled *Theses de febre intermittente*. The most interesting parts of this thesis were the *corollaria* and *quodlibeta*, including theses about air pressure, vacuum, the

corporeal nature of light, and the principle of inertia. After this he travelled back to Zeeland, but soon moved to the city of Breda in Brabant, partly, as he said himself, to court a young lady. In Breda, by pure coincidence, he met the young René Descartes, who had gone to Breda in order to enlist himself in the army of Maurits, Prince of Orange, the military leader of the Dutch Republic. The two discussed topics in mathematics and music and became friends. Around 1 January 1619, Beeckman left Breda and found employment as a teacher at the Latin School in Utrecht. In 1620 he married Cateline de Cerf, whose family had also fled the Southern Netherlands and moved to Middelburg. Over the years she bore him seven children, most of who, however, died at a very early age.

At the end of 1620, Beeckman moved to the port city of Rotterdam, where his brother Jacob had become principal of the local Latin School and could use some help from his sibling. In 1624 Isaac's position was formalized when he became the vice-principal. In Rotterdam, Beeckman, together with some artisans and merchants, founded the Collegium Mechanicum, an informal society which discussed all sorts of technical projects but also asserted itself as an advisory body for the city government. Beeckman also got involved in a series of disputes on the attitude the Reformed Church should adopt towards the so-called Remonstrants, a liberal faction within the Reformed Church that had been thrown out in 1619. Although Beeckman was to a certain extent an orthodox believer, he belonged to those church members who favoured a more lenient approach to the Remonstrants. In 1627, however, before the dispute was finally settled, Beeckman moved to the nearby city of Dordrecht, where he became principal of the Latin School. The Collegium Mechanicum was disbanded after his departure.

In Dordrecht, Beeckman resumed contact with Descartes, who visited him in 1628 and 1629, before settling down in Amsterdam and elsewhere in the Dutch Republic. Also, the French philosophers Piere Gassendi and Marin Mersenne paid him a visit. In 1630, however, Beeckman and Descartes fell out with each other, purportedly because Descartes was informed (incorrectly) that Beeckman had claimed to be his master, but more probably because Descartes thought that Beeckman might become a rival in publishing his own account of the mechanical philosophy of which Descartes claimed to be the sole originator. Although they re-established a more or less friendly relationship after a year or two, the old friendship never returned and this quarrel cast a shadow over Beeckman's later years. In these final years, the entries in the notebook stopped, except for extensive reports of his efforts to learn the craft of lens grinding. On 19 May 1637, he died of consumption, the disease his brother Jacob had succumbed to in 1629. With her two surviving

daughters, Beeckman's widow returned to Middelburg. In 1644 Beeckman's younger brother Abraham succeeded in publishing a collection of entries in his brother's notebook as the *Mathematico-physicarum meditationum, quaestionum, solutionum centuria*, but this publication hardly caused a ripple in the Dutch community of mathematicians, natural philosophers, and physicians that was by then almost hypnotized by the publications of Descartes. Only when De Waard announced his discovery of the *Journal* centuries later did it begin to dawn upon historians of science and philosophy that Beeckman had not been as insignificant as they thought he had been after all.

Historiography

As sure as we are about the outlines of Beeckman's life, historians of science and philosophy are less certain about the interpretation of his natural philosophy, its origins, and its influence. In the classical period of the history of science, attention was mainly focused on the development of the theories and methods of science in its early stages, in what came to be known as the Scientific Revolution. Eminent representatives of this approach who studied the contribution of Beeckman to the development of the new science were Cornelis de Waard, the editor of the *Journal*, E.J. Dijksterhuis, and Alexandre Koyré.[5] In later years, John Schuster, Floris Cohen, Giancarlo Nonnoi, Benedino Gemelli, Henk Kubbinga, and Richard Arthur continued to explore Beeckman's contribution to the rise of modern science.[6] These scholars were surely sensitive to influences traditionally seen as external to science on the development of Beeckman's ideas, but they nevertheless stressed his contribution to the theory of matter, the science of mechanics,

5 Cornelis de Waard, *L'Expérience barométrique, ses antécédants et ses explications. Étude historique* (Thouars: Imprimerie nouvelle, 1936); Cornelis de Waard, 'Sur les règles du choc des corps d'apres Beeckman', in: *Correspondance du P. Marin Mersenne, religieux minime*, publiée par Mme Paul Tannery, editée et annotée par Cornelis de Waard et al., 17 vols. (Paris: Beauchesne, 1932-1988), II (1936), pp. 632-644; Dijksterhuis, *The Mechanization of the World Picture*; Alexandre Koyré, *Études galiléennes* (second ed., Paris: Hermann, 1966).

6 John A. Schuster, *Descartes and the Scientific Revolution, 1618-1634: An Interpretation* (PhD diss., Princeton University, 1977); H. Floris Cohen, *Quantifying Music: The Science of Music at the First Stage of the Scientific Revolution, 1580-1650* (Dordrecht: Reidel, 1984); Giancarlo Nonnoi, *Il pelago d'aria. Galileo, Baliani, Beeckman* (Rome: Bulzoni Editore, 1988); Benedino Gemelli, *Isaac Beeckman. Atomista e lettore critico di Lucrezio* (Florence: Leo S. Olschki, 2002); H.H. Kubbinga, *L'Histoire du concept de 'molecule'*, 3 vols. (Paris: Springer, 2002), I, pp. 203-237; Richard Arthur, 'Beeckman, Descartes and the Force of Motion', *Journal of the History of Philosophy* 45:1 (2007), pp. 1-28.

the theory of music and natural philosophy in general. Similarly, Reyer Hooykaas studied the impact of Beeckman's religious beliefs on his natural philosophy.[7]

In the 1980s, however, the social history of science emerged as a serious new approach to the history of science of the early modern period. It resulted from a process, going back at least to the 1940s, in which an increasing number of social groups and their practices were identified as co-constitutive in the making of the new sciences of the early modern period. The introduction of hands-on or practical knowledge of matter (living and dead, natural and artificial) into the natural sciences has been attributed to 'superior artisans' (Edgar Zilsel and Paolo Rossi),[8] visual artists (Erwin Panofsky),[9] printers (Elizabeth Eisenstein),[10] merchants and explorers (Harold Cook)[11]; other groups that have been identified are medical practitioners and aristocrats or *virtuosi*.[12] Not only new groups of people, but certain previously ignored sites and practices also came under investigation as places for the making of knowledge about nature and the world, such as the cabinets of curiosities

7 R. Hooykaas, 'Science and Religion in the Seventeenth Century: Isaac Beeckman, 1588-1637', *Free University Quarterly* 1 (1951), pp. 169-183.

8 See the collection of Zilsel's essays in: E. Zilsel, *The Social Origins of Modern Science* (Dordrecht: Kluwer Academic Publishers, 2003); see also: Philip P. Wiener and Aaron Noland, eds., *Roots of Scientific Thought: A Cultural Perspective* (New York: Basic Books, 1957). For Rossi, see: Paolo Rossi, *Philosophy, Technology, and the Arts in the Early Modern Era*, trans. by Salvatore Attanasio, ed. by Benjamin Nelson (New York: Harper & Row, 1970); more recently: Pamela O. Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore: Johns Hopkins University Press, 2001); Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2004).

9 See: Erwin Panofsky, 'Artist, Scientist, Genius: Notes on the "Renaissance-Dämmerung"', in: Wallace K. Fergusan et al., *The Renaissance* (New York: Harper Torchbooks, 1962), pp. 123-182; more recently Svetlana Alpers, *The Art of Describing: Dutch Art in the Seventeenth Century* (Chicago: University of Chicago Press, 1984); Brian W. Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago: University of Chicago Press, 2006); Tine L. Meganck, *Pieter Brueghel the Elder, Fall of the Rebel Angels: Art, Knowledge and Politics on the Eve of the Dutch Revolt* (Milan: Silvana Editoriale, 2014); Marisa A. Bass, *Insect Artifice: Nature and Art in the Dutch Revolt* (Princeton: Princeton University Press, 2019).

10 E. Eisenstein, *The Printing Press as an Agent of Change: Communication and Cultural Transformations in Early Modern Europe* (Cambridge: Cambridge University Press, 1980).

11 Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven: Yale University Press, 2007).

12 See, for example: E. Leong and A. Rankin, eds., *Secrets and Knowledge in Medicine and Science, 1500-1800* (Farnham/Burlington: Ashgate, 2011); Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985).

that became popular among princes and rich city dwellers in the sixteenth and seventeenth centuries.[13]

In general, these groups are associated with the making of a knowledge culture out of which the natural sciences developed, grounded in collecting, observation, and experiment. They contributed 'something' from their world of practice to the culture of 'experience' as it developed and gained status over the course of the seventeenth century. The argument is that in the new science the knowledge of 'things', *naturalia* and/or *artificialia* (how-to knowledge), met with theoretical philosophizing (knowledge of causes).[14] Put differently, practical manipulations of matter which had been the 'impure' (that is, irrational) domain of the mechanical arts were integrated with the theorizing on rules and causes, which had been the 'pure' (that is, rational) domain of the liberal arts and sciences. In particular, the tradition of 'books of secrets' and engineering expertise have been identified as important spheres of practical knowledge that contributed to this 'revolution' of both the practice of science and the practice of the arts.[15] Thus, hands-on dealing with nature, rather than just philosophical speculation, moved to the centre of attention in the history of science. Klaas van Berkel's 1983 dissertation *Isaac Beeckman (1588-1637) en de mechanisering van het wereldbeeld* (revised and translated as *Isaac Beeckman on Matter and Motion: Mechanical Philosophy in the Making*, 2013) marks the transition from the classical history of science to the social history of science. Commenting on the criteria Beeckman put forward for any decent explanation in natural philosophy and physics, Van Berkel claimed: 'He views the world like a craftsman inspecting a machine he is about to repair.'[16]

The success of the social history of science has been overwhelming, and in turn has evolved into the interdisciplinary history of knowledge of the

13 See especially: Oliver Impey and Arthur MacGregor, eds., *The Origins of Museums: The Cabinet of Curiosities in Sixteenth- and Seventeenth-Century Europe* (Oxford: Clarendon Press, 1985). For cabinets of curiosities in the Dutch Republic, see: Ellinoor Bergvelt et al., *De wereld binnen handbereik. Nederlandse kunst- en rariteitenverzamelingen, 1585-1735* (Zwolle: Waanders, 1992).

14 See: Anthony Grafton and Nancy Siraisi, eds., *Natural Particulars: Nature and the Disciplines in Renaissance Europe* (Cambridge, Mass.: MIT Press, 1999); Pamela H. Smith, Amy R. Meyers, and Harold J. Cook, eds., *Ways of Making and Knowing: The Material Culture of Empirical Knowledge* (Ann Arbor: University of Michigan Press, 2014); Lissa Roberts, Simon Schaffer, and Peter Dear, eds., *The Mindful Hand: Inquiry and Invention from the Late Renaissance to Early Industrialisation* (Amsterdam: KNAW, 2007).

15 See: William Eamon, *Science and the Secrets of Nature: Books of Secrets in Medieval and Early Modern Culture* (Princeton: Princeton University Press, 1994); Alison Kavey, *Books of Secrets: Natural Philosophy in England, 1550-1600* (Urbana: University of Illinois Press, 2007).

16 Van Berkel, *Isaac Beeckman on Matter and Motion*, p. 137.

early twenty-first century. In the history of knowledge approach, unlike the older social history of science, well-established disciplinary boundaries are being historicized and identified as the nineteenth-century outcome of the making of the new sciences. As the outcome clearly did not exist in the early modern world, these boundaries cannot be used to generate genealogies of the sciences, which means that the histories that were written of these sciences at the time of their making and the institutionalization of their boundaries can no longer be taken for granted. This is the fundamental belief of the new history of knowledge. It calls into question our current epistemic hierarchies and opens up ever new spaces, communities, and networks of knowledge-making. The new approach disregards and even dismantles these hierarchies and urges historians to trace the trajectories of their making and subsequent interaction.[17]

At the same time, social and cultural historians and sociologists uncovered 'non-scientific' types of knowledge, sometimes in relation to the then existing epistemic hierarchies called subjugated forms of knowledge. It is commonly understood that, in early modern Europe, previously subjugated or geographically distant forms of knowledge (from Asia, Africa, the Americas) were integrated into newly configured socially powerful and productive epistemic communities which eventually gave rise to the new sciences.[18] The history of knowledge aims to study the full range of knowledges and their relationships and hierarchies that humans have produced, with modern science being one of the forms among many, and the heir of many more. Recently, it has been argued (again) that (parts of) the humanities should also be recognized as the ancestors of modern science.[19] A potential problem with that claim, however, is that it seems to ignore older claims and reintroduces modern disciplinary hierarchies into the study of their making. It might also have the effect of re-enforcing the current status of the natural sciences at the top of the epistemic hierarchy. In order to write histories of knowledge, as a rule of method, one should

17 On the social history of knowledge in general, see the introductory texts: Peter Burke, *A Social History of Knowledge: From Gutenberg to Diderot* (Cambridge: Polity Press, 2004), and his *What Is the History of Knowledge?* (Cambridge: Polity Press, 2017).

18 The definition and demarcation of the history of knowledge (and what it is not) is discussed in: Lorraine Daston, 'The History of Science and the History of Knowledge', *KNOW: A Journal on the Formation of Knowledge* 1 (2017), pp. 131-154; Johan Östling, David Larsson Heidenblad, and Anna Nilsson Hammar, eds., *Forms of Knowledge: Developing the History of Knowledge* (Lund: Nordic Academic Press, 2020); see also the contributions in the *Journal for the History of Knowledge* 1:1 (2020).

19 Rens Bod, *A New History of the Humanities: The Search for Principles and Patterns from Antiquity to the Present* (Oxford: Oxford University Press, 2013).

maybe ignore or temporarily forget reigning disciplinary divisions and hierarchies.[20]

The shift from history of science to social history of science and then to history of knowledge has far-reaching (and sometimes controversial) consequences for the way in which historians now describe and analyse the rise of the mechanical philosophy in the seventeenth century, with which the name of Isaac Beeckman is inextricably linked. In the classical approach, the causes of the making of this philosophy of nature are sought in the world of theory, as a result of debates within an established field of natural philosophy. Since the history of knowledge questions this assumption and operates from the foundational belief that the modern sciences cannot simply be understood as the heirs of a pre-existing 'institution' of natural philosophy, the main concern is to establish exactly what types of knowing and what related practices made it into Beeckman's new mechanical philosophy of nature, and how, and what disciplinary boundaries and new epistemic hierarchies emerged from the merger of these previously disconnected worlds. This natural philosophy was an entirely new project, which certainly had not found any clear boundaries or any new epistemic hierarchy by the time of its constitution around 1600. One might even say that around 1600 it was less clear than ever before what natural philosophy was.

Bringing the study of Isaac Beeckman up to date with the current move toward the history of knowledge therefore requires a more broadly conceived contextual approach to his new ways of dealing with nature. Not primarily to explain the choices he made, but to understand what he was doing or what he thought he was doing. Beeckman was born in a part of Europe that underwent tremendous changes in its social, political, economic, religious, intellectual structure and orientation towards oceanic navigation, trade and warfare.[21]

20 As quoted in: Rens Bod, 'How to Open Pandora's Box: A Tractable Notion of the History of Knowledge', *Journal for the History of Knowledge* 1:1 (2020), art. 5, pp. 1-7, esp. p. 1, n. 3.

21 The literature on the Dutch Republic is enormous. Maarten Prak, *The Dutch Republic in the Seventeenth Century: The Golden Age* (Cambridge: Cambridge University Press, 2005), is an excellent introduction, with a strong focus on social and economic structures. More focused on cultural developments is: Willem Frijhoff et al., *Dutch Culture in a European Perspective, Vol. 1: 1650: Hard-Won Unity* (Assen: Van Gorcum/Basingstoke: Palgrave Macmillan, 2004). Slightly older, but no less useful is: Jonathan Israel, *The Dutch Republic: Its Rise, Greatness, and Fall, 1477-1806* (Oxford: Clarendon Press, 1998). On the immigrants from south to north, see: Oscar Gelderblom, *Zuid-Nederlandse kooplieden en de opkomst van de Amsterdamse stapelmarkt (1578-1630)* (Hilversum: Verloren, 2000). The role of immigrants in Zeeland, who dominated the province demographically and supported its rise to global power, has not (yet) been studied. The reverse movement of loyal Catholics leaving the Dutch Republic has been (largely) ignored, but see recently: Geert H. Janssen, *The Dutch Revolt and Catholic Exile in Reformation Europe* (Cambridge: Cambridge University Press, 2014).

Middelburg, the city in which Beeckman was born in 1588, was the capital of the province of Zeeland, one of the provinces that had managed to remove Philip II as their sovereign and to form a confederation of free provinces, also known as the Dutch Republic. During Beeckman's lifetime, the new Republic was engaged in a wide-ranging war against Philip II and his Habsburg successors both in the Low Countries and in the global East and West. Having become a centre for the global operations of the Dutch seaborne empire (through its chambers of the Dutch East India and West India Companies), Middelburg was a burgeoning and lively city with old contacts with Flanders, Brabant, Holland, England, France, and the Iberian peninsula. By the time of Beeckman's death, however, due to its role as a political and economic centre in the Dutch global trade and warfare, the city had also developed more extensive connections to trading posts and colonial settlements in Africa, Asia, and the Americas as well. This global centre, like the rest of the Republic, also absorbed an influx of thousands of immigrants from the southern provinces of the Netherlands after 1585. Immigrants poured in from the cities that were forced to surrender to the multinational 'Spanish' Army of Flanders (such as Brussels, Ghent, Bruges and Antwerp in the years 1584-1585).

These immigrants brought with them capital, knowledge and connections that further energized an already expanding Dutch economy. Since most of the newcomers adhered to the Reformed creed, they further strengthened the Protestant nature of the new state. From the beginning, the University of Leiden, founded in 1575 as a reward for the hardships endured during the siege of the city by the Spanish troops in the previous year, prided itself as a bulwark of freedom (*praesidium libertatis*). Because the nobility, with the exception of the most eminent noble family, the Oranges, to some extent lost power and the Catholic Church had gone underground, the young Dutch Republic was mainly a commonwealth of burghers, and especially in the early decades of the seventeenth century, social upward mobility was a real possibility for many of them; yet at the same time, as social and economic historians have pointed out, life was expensive and many inhabitants lived in dire poverty. The young state was also burdened with debt.

This globally connected part of Europe, the now transnational Scheldt region (divided in a Catholic Habsburg and a Protestant part) and the province of Holland, was the world in which Isaac Beeckman largely moved; first-born son of immigrants from the southern provinces who, after a stay as refugees in England, prospered in Middelburg. His father a staunchly Reformed artisan and practitioner with good connections to family and friends in England, a strong personality intent on giving his sons a good education and

his daughters a good match. After the death of Isaac Beeckman the family, including Beeckman's daughter Catelyntje, quickly moved up in the ranks of Middelburg's elites. The Dutch Republic had taken over the leading role of the bustling cities of the southern Low Countries in the area. Many of the coastal cities in the Dutch Republic in particular now resembled sixteenth-century Antwerp, having become a multilingual country full of opportunities, open to the world, eager to incorporate new ideas, experimenting with new ways of life, and forced to be tolerant towards dissenters and heretics from elsewhere because of the minority status and strict membership policies of its public Reformed Church; yet rather intolerant towards Catholics and radically minded Protestants. From the perspective of the history of science and the study of nature in general the Dutch Republic has been compared to a laboratory.[22] Its western provinces, oriented towards the seas and the oceans, certainly can be compared with Deborah Harkness's London of the sixteenth century, a city she characterized as a 'proto-Baconian' sphere.

This volume brings together more classical studies of early modern scientific theory with contextual studies and exercises in the history of knowledge related to Beeckman. The chapters have been ordered in three major categories. The first part of the volume, entitled 'Assessing Beeckman', contains chapters that evaluate in general terms the place of Isaac Beeckman in the seventeenth-century world of nature study. John Schuster aims to establish what sort of philosophy Beeckman was doing, what prompted him to accept a mechanical and corpuscular philosophy of nature and what his exact place in the Scientific Revolution of the seventeenth century was. Responding to a suggestion by Schuster, Floris Cohen imagines how Beeckman would have looked back – had he lived until the 1660s – on his own philosophical career and especially his troubled relationship with Descartes. Finally, Klaas van Berkel deconstructs how Cornelis de Waard edited Beeckman's manuscript. He unravels the way in which De Waard framed Beeckman and thereby makes space for new ways of interpreting the philosopher.

The second part of the volume is devoted to chapters that analyse Beeckman's contribution to specific scientific disciplines or fields of interest. Tiemen Cocquyt discusses Beeckman's initial understanding of the telescope, which he characterizes as being technological, notwithstanding his acquaintance with Johannes Kepler's optics. Édouard Mehl details the

22 Klaas van Berkel, 'The Dutch Republic: Laboratory of the Scientific Revolution', *Bijdragen en Mededelingen betreffende de Geschiedenis der Nederlanden/The Low Countries Historical Review* 125 (2010), pp. 81-105.

reactions of Beeckman and his circle to Kepler's optics and astronomy, with consequences also for the interpretation of Descartes' philosophy. With Elisabeth Moreau we turn to medicine, a field also studied extensively by Beeckman. She shows how Beeckman's physiology is a clever combination of modern atomism with Galenic medicine. Dániel Moerman then discusses how Beeckman, who was trained as a medical doctor but never settled as such, treated himself and close friends in cases of illness and death. Samuel Le Gendre discusses the role of mechanics and more specifically the principle of the conservation of motion or inertia. The author makes the case that Descartes may very well have come across this basic principle of mechanics before he met Beeckman, thereby inviting us to add much more precision to the study of what exactly Descartes learned from Beeckman during their famous exchange in November-December 1618. In the last chapter of this section Fabrizio Baldassarri highlights some little known entries by Beeckman that show how he used a mechanical interpretation of the way plants grow and react to external circumstances.

The third part of the volume contains chapters that survey or discuss the intellectual, cultural, social and linguistic context in which Beeckman lived. Huib Zuidervaart delves into the networks of knowledge that existed in Middelburg during Beeckman's youth, including his family network. The appendix on the houses where Beeckman grew up also reveals some interesting things about the favourable financial and material conditions of his youth. Music has always been one of the recurring themes in the *Journal* and therefore Albert Clement provides an overview of the rich musical life in Middelburg before and during Beeckman's lifetime. Arjan van Dixhoorn discusses another aspect of cultural life in Middelburg and elsewhere in the Low Countries: the culture of the rhetoricians (*rethoryckers* in early modern Dutch, *rederijkers* in modern Dutch). He claims that Beeckman's special way of philosophizing is heavily indebted to the *consten*-culture (a vernacular culture of the arts and science) of which the rhetoricians claimed to be the core. In Fokko Jan Dijksterhuis's contribution the focus shifts from Middelburg to Rotterdam, where Beeckman lived from 1620 to 1627. In this booming port city, Beeckman devoted much time and energy to the discussion and manipulation of atmospheric machines, especially those inspired by the controversial inventor and projector Cornelis Drebbel. Dijksterhuis characterizes Beeckman's way of dealing with nature as 'thinking with machines'. Vera Keller then discusses Drebbel's often misunderstood habit of communicating his ideas and findings 'only to good friends and philosophers', which offers a clue to the problem many historians of science have raised in discussing Beeckman: why did he publish

so little of his ideas and why did he even acquire a reputation of being 'incommunicative'? Communication is also central to the contribution by Semra Meray, who methodically studies the use of Stevinian terms and expressions in Beeckman's *Journal* (which was very limited) and Beeckman's switching between Latin and Dutch. The final contribution to this part is by Klaas van Berkel, who, in this second contribution to this collection, analyses Beeckman's use of illustrations in his *Journal* and concludes that in Beeckman's pictorial way of reasoning images sometimes acquired an argumentative force of their own.

In the concluding remarks two of the editors identify some directions for further research, conscious as they are that the richness of Beeckman's *Journal* has by no means been fully exhausted. Although the authors of this volume have contributed to a more precise, less anachronistic understanding of Beeckman and his unique position in the worlds of knowledge of the seventeenth century, there is so much more that remains to be explored. We hope that this volume invites the authors and others to do just that and join the quest.

Amsterdam
University
Press