David Gorlæus (1591-1612)

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Chapter 2

Gorlæus’ Two Treatises

In order to be able to appreciate Gorlæus’ place in the intellectual landscape of the opening years of the seventeenth century, and to assess his possible contribution to the history of philosophy and science, we must first acquaint ourselves with his ideas. Since his works are in Latin, and no one has ever provided a detailed synthesis of their contents, it is inevitable that we ignore the traditional order of presentation and begin with a synopsis of his thought before reconstructing his life.

2.1. METHOD OF PRESENTATION

There are different ways in which one can expound the ideas of a philosopher. The most obvious manner of presenting Gorlæus’ philosophy is by condensing the arguments of his two works into a single paraphrase. This is because the *Exercitationes philosophicae* (printed in 1620) and the *Idea physicae* (printed in 1651) bear a straightforward relation to each other. The 352-page *Exercitationes* tries to anchor Gorlæus’ natural philosophy in an ontology, or philosophy of being. By contrast, the scope of the 76-page *Idea* is more straightforward and simple: it limits itself to the domain of natural philosophy (*physica*) and anticipates the doctrines of natural philosophy of the latter parts of the *Exercitationes*. The relation between the two books can be gauged by a comparison of their thematic structure. The *Idea physicae* is composed of thirteen chapters, which rehearse the traditional succession of themes in courses of natural philosophy:

- Ch. 1: Which treats of the constitution of physics and nature
- Ch. 2: On (what are commonly called) the internal principles of nature
- Ch. 3: On the external principles of natural things
- Ch. 4: On composition, quantum and the continuum
- Ch. 5: On motion, place and time
- Ch. 6: On the heavens
- Ch. 7: On the elements and mixture
- Ch. 8: On meteors
Although in his *Idea physicae* Gorlaeus redefines a host of Aristotelian doctrines, its structure nevertheless mirrors that of traditional textbooks; these in turn follow the canonical order of the Aristotelian works: from the *Physics* by way of *De caelo*, *De generatione et corruptione* and *Meteorology* to the treatise *De anima*. The *Exercitationes philosophicae*, by contrast, has a more innovative structure, although the traditional order remains visible in its eighteen *exercises*, which carry the following titles:

Ex. I: (No title) [Definition and function of philosophy; refutation of traditional metaphysics]
Ex. II: On being
Ex. III: On distinctions
Ex. IV: On the universal and singular
Ex. V: On the accident
Ex. VI: On quantity
Ex. VII: On quality
Ex. VIII: On relations
Ex. IX: On motion
Ex. X: On place
Ex. XI: On time
Ex. XII: On the composite
Ex. XIII: On atoms
Ex. XIV: On matter and form
Ex. XV: On the coming-about and perishing of things
Ex. XVI: On the heavens
Ex. XVII: (No title) [On the elements; and that the Earth does not move]
Ex. XVIII: On the soul

This succession of themes represents a noteworthy and novel blend of a physical succession (comparable to that found in the *Idea physicae*) with a different, logico-methodological order. It starts from a definition of philosophy and proceeds by way of an ontological definition of being and a characterization of mental concepts to the categories of being and their composition. Let us anticipate that this order of presentation is half-way between the traditional structure of traditional
textbooks in natural philosophy and that of Descartes' *Principles of Philosophy*.

I have not found any substantial doctrinal differences that would permit me to define the chronological relation of the *Idea physicae* and the *Exercitationes* in terms of an evolution of ideas. What has evolved, however, is the structure of the argument. The *Idea physicae* invokes all kinds of beings (*entia*), including atoms, without properly introducing or justifying them. The *Exercitationes*, by contrast, with its extensive introductory ontology, epistemology and logic carefully prepares the territory. It is as if Gorlaeus had understood, or had been told, that the novel physics he presented in the *Idea physicae* required a metaphysical basis and that he therefore decided to compose his more extensive *Exercitationes*. That the latter work is posterior in time may also be concluded from the fact that the *Exercitationes* is clearly unfinished, while the *Idea physicae* is complete.

Logically speaking, the relation between the two works is this: The *Idea physicae* stands to the *Exercitationes philosophicae* in a relation of subordination, even though it occasionally expresses Gorlaeus' ideas with greater clarity and succinctness.

For our presentation, this means that Gorlaeus' overall project is best presented by following the philosophical exposition given in the *Exercitationes*, using the *Idea* as an auxiliary text. Concerning the chronology of composition, the two works must both have been written between 1610 and early 1612, because they both contain a reference to Galileo's astronomical discoveries announced in the *Sidereus nuncius* of 1610. Nevertheless, I tend to think that the *Idea physicae* was written first, the *Exercitationes* later. This assumption is not only prompted by the just-mentioned fact that the *Exercitationes philosophicae* is unfinished, while the *Idea physicae* looks complete. There are also some differences in content that suggest that Gorlaeus first worked on his thematically more restricted short treatise on physics, before starting work on his more ambitious *Exercitationes*, which prefaces the physical part with an extensive metaphysics. Such an order would also follow the logic of his biography, as we shall be able to verify in chapter 3. However, irrespective of whether this chronology is correct or not, the extreme temporal vicinity of the composition of the two works and the near total doctrinal identity between them allow us to treat them as the expression of an almost unchanged state of mind.

The method followed for our paraphrasis is the typical mixture of historical and rational reconstruction that most intellectual historians tend to use almost instinctively. The term ‘historical reconstruction’ refers to the historian's attempt to stay as close to the author's viewpoint as possible, by expounding what the historical author seems to have found important (rather than what we find important or interesting from our own perspective) and by employing his own terms (rather than ours). ‘Rational reconstruction’, by contrast, refers to the contribution that the historian makes to the historical argument in the process of organizing and
expounding it. It also refers to the evaluative and critical elements that enter into his presentation. After all, we do not simply want to parrot Gorlaeus’ words; we are also entitled to point out apparent difficulties or opacities in his argument and explain them either by conceptual means or through external influences such as religious, ethical or political circumstances.

Finally, wherever we do not understand what Gorlaeus means, or why he proposes what he does, we will follow a method, sketched by Quentin Skinner, that might be characterized as ‘concentric’: one elucidates texts by placing them in the context of other texts, first by the same author, followed by his acquaintances and friends and then by contemporary authors with which he was acquainted. Finally, one places all of these texts in the socio-cultural context of the period in which the text one wishes to understand originated. The meaning that one thereby believes one has uncovered must, however, never be identified with the intention of the author. Inevitably, the author’s intention will remain disappointingly elusive. However, what can be gauged is the significance of certain ideas in a given situation, notably by the reactions they elicited. Judging by this method, Gorlaeus’ ideas had a larger impact than has hitherto been understood.

Fig. 3: Almost all known copies of Gorlaeus’ *Exercitationes philosophicae* (1620) indicate “the widow of Jan Commelin” as the editor of the book. (Courtesy of Tresoor, Frysk Histoarysk en Letterkundich Sintrum, Leeuwarden)
2.2. A DESCRIPTION OF GORLAEUS’ TWO WORKS

Let us begin with a description of the two posthumous works. The first and longer of the two is an octavo edition of 352 pages, which carries the following information on its title page (see Figures 3 and 4):

Philosophical Exercises of David Gorlaeus of Utrecht, edited after the death of the author, in which the entire body of theoretical philosophy is discussed, and in which several essential dogmas of the Aristotelians are overturned. With a double index.

All but one out of the dozens of copies of the Exercitationes that I have examined carry a title page that corresponds to Figure 3, which indicates as the publisher of the book the Commelin firm and a commission by the widow of Jan Commelin, without mention of the place of publication. There exists one copy indicating a different publisher (see Figure 4): it is the copy of the British Library, which reads: “Leiden, commissioned by Jan Ganne and Harman van Westerhuyzen, 1620.”

Fig. 4: There is only one copy of the Exercitationes philosophicae currently known that indicates Leiden as the place of printing and Jan Ganne and Harman van Westerhuyzen as the publishers. (Courtesy of The British Library)
The publisher, who appears on the overwhelming majority of copies as Jan or Johannes Commelin or Comelinus, Jr. (1548-1615), had transformed himself from a printer into an international publisher with offices in the Netherlands, Heidelberg and Geneva. After his death, his widow, Trijn Jansdr. Valckenier, continued to run the company, probably out of Amsterdam as some sources suggest, until her own death in 1621. In the same year of the *Exercitationes*, she commissioned other publications, which carry the same indication as that found on Gorlaeus’ title page (“In Bibliopolio Commeliano,” etc.), including an edition of Cato’s *De re rustica* and the seventh edition of Augustin Marlorat’s *Expositio* of the New Testament. However, in those cases, she used the Commelin’s printer’s device, a naked woman in a laurel wreath, which is absent in the case of the work under examination. The emblem resembles that used until 1619 by Jodocus van Coster, but the motto inserted therein (“Fabricando fabri fimus”) is found on no other publication of the period; neither by Van Coster nor anyone else.

What might the link have been between the Commelins and the set of names found on the London copy? Around 1620, Jan Commelin’s sons Abraham, Isaac and Jacob tried to get a foot into the Leiden book business. Their mother, “Commelin’s widow,” as she is called on Gorlaeus’ title page, helped them in this attempt. The *Exercitationes* were probably financed by her for the greater part, with the Leiden publishers and printers Johannes Ganne and Harman van Westerhuyzen as junior partners in this enterprise and the Commelin sons as intermediaries. That Ganne had contacts with the Commelins is known from legal acts. That Ganne and Van Westerhuyzen figure only on a single known copy of the book might in this case have to be explained by the fact their financial contribution entitled them only to a small fraction of the total number of copies printed and sold.

Little is known about Ganne and Van Westerhuyzen, who worked at the lower end of the spectrum of Leiden printers; earning their living with small-scale publishing, printing and book binding. Most survey works on Dutch seventeenth-century publishers and printers simply ignore the two men, although it appears that Van Westerhuyzen was the more active between them. There exist a number of editions of Dutch poems by the famous humanist and Leiden professor Daniel Heinsius (1580-1655) on which his name appears as a publisher.

Let us however return to the title page, which, as we have seen, is dry and factual: it gives the author’s name and birth place, indicates that the publication is a posthumous work, and gives a descriptive title which tells the reader what he can expect to find in the book. Whether the title is Gorlaeus’ own or has been added by its editor is unclear. It has the same logic, however, as the title that Sébastien Basson had chosen for his atomist treatise of natural philosophy of 1621: “Twelve books of natural philosophy against Aristotle. In which the forgotten physics of the ancients is re-established and Aristotle’s errors are refuted by solid
We may assume that at least the main title, *Philosophical Exercises*, corresponds to Gorlaeus’ intention, because the eighteen chapters that structure his book are called “exercises.” This preference for “exercises” over “chapters” may in fact contain an homage to Julius Caesar Scaliger’s polemical “Fifteenth Book of Exoteric Exercises about Subtlety, against Girolamo Cardano.”

Julius Caesar Scaliger (1484-1558), who was born as Benedetto Bordone into simple circumstances, claimed that he was a scion of the Della Scala family, which had ruled over Verona for a century and a half. Flamboyant in his life and in his work, he trained in philosophy and medicine and worked for most of his life in France. His extremely disorganized but brilliant *Exotericae exercitationes* of 1557 (of which only the fifteenth volume was published!) enjoyed a great but to some degree still ill-understood success north of the Alps, where it was reprinted frequently well into the seventeenth century. These polemical exercises pretended to be fiercely conservative in defending Aristotle against modern ideas such as Cardano’s, while in truth proposing a host of new ideas.

As for Gorlaeus, that he admired Scaliger and particularly his *Exercitationes* is evident: Scaliger is the only recent author who is mentioned by name in both of Gorlaeus’ books. Moreover, he is also invoked in Gorlaeus’ entry in the *Album amicorum* of his friend Engelbert Egidius van Engelen.

By contrast, the editor of the *Exercitationes* remains unnamed. Until new evidence comes to the fore, we must leave this question unanswered. It clearly cannot have been Gorlaeus’ parents, as they had both passed away in the meantime. But who else had an interest in 1620 to publish the reflections of a student who had passed away eight years earlier, and to do so at that precise historical moment? Was it simply the executor of the testament of Gorlaeus’ father, Carel van Gelder, who was also Gorlaeus’ cousin, who decided to have the book printed for a profit?

If the reconstruction of the intellectual intentions of the *Exercitationes* provided below is of any value, it is clear why this work would have been published in such a secretive fashion: to readers who had either known Gorlaeus personally or who understood the philosophical and theological thrust of his philosophy, it would have been evident that it was connected to the Remonstrant (or ‘Arminian’) faction of Dutch Protestantism, which had officially been condemned at the Synod of Dort the year before the *Exercitationes* was published. Knowing about the Gorlaeus family’s connection to the Arminians, the Dutch chemist and historian Frans Maurits Jaeger long ago proposed that the philosopher and Arminian theologian Petrus Bertius, an acquaintance of Gorlaeus’ uncle Abraham, might have been the editor of the *Exercitationes*. This suggestion was however based on the mistaken idea that Gorlaeus had taken his first degree at Leiden’s *Statencollege*.

Finally, it must be pointed out that the process of editing, publishing and proofreading were carried out hastily and negligently. To begin with, Gorlaeus, who
seems to have been a competent Latinist – as is evidenced by both his childhood poetry and his *carmen* in praise of Stellingwerff – does not give his best in this work, which is written in pedestrian and oftentimes wooden Latin. No one seems to have edited his sometimes sloppy style before publication. Nor did the printer and his proofreaders do a much better job. The thoroughly corrected copy held at the Universitätsbibliothek Basel, for example, shows how often a competent reader could have reason to take exception with the printed text.\textsuperscript{16} The only improvement to the manuscript may have been the *index rerum* that was added to it. The most severe shortcomings of *Exercitationes* are however not only of a grammatical, syntactic or typographic order. The most obvious defect of this work is that it is incomplete. The book’s eighteenth and last “exercise” is not only unfinished, but is clearly tacked on.

As for Gorlaeus’ second treatise, the *Idea physicae*, it is an exceptionally rare book. Although it was printed in Utrecht, no public collection in the Netherlands owns a copy of it, and most early modern bibliographers ignored its very existence. Its title page conveys the following information (see Figure 5):

Sketch of Physics, of David Gorlaeus of Utrecht, to which is added an Epistle by an anonymous author on the Motion of the Earth.

![Idea physicae](image)

*Fig. 5:* Gorlaeus’ *Idea physicae*, published together with Rheticus’ treatise on the motion of the Earth, is an exceedingly rare book. No Dutch public library currently possesses a copy of it, although the work was printed in Utrecht. (Courtesy of The British Library)
This time, there is no mystery concerning the publisher. Johannes Janssonius van Waesberge (active between 1642 and 1659 in Utrecht and thereafter in Amsterdam) was an established printer and publisher, who worked in Utrecht from a shop that was located in front of the town hall.

The book containing the *Idea physicae* is a tiny, modest duodecimo edition, of which Gorlaeus’ treatise takes up only 76 pages. As the title page indicates, the book contains also a second treatise, which is called “Epistle on the Motion of the Earth” (*Epistola de terrae motu*) on the common frontispiece and “Dissertation on the Hypothesis of Copernican Astronomy” (*Dissertatio de Hypoth[esi] Astron[omiae] Copernicanae*) on the separate title page. What to Van Waesberge was an anonymous treatise was some decades ago identified by Reijer Hooykaas as a highly important early treatise by Georg Joachim Rheticus (1514-1574), Copernicus’ only pupil and his most faithful early propagator. This *opusculum*, which according to Hooykaas may originally have carried the title “About the Motion of the Earth and Holy Scripture” (*De terrae motu et Scriptura Sacra*), was written between 1532 and 1541, and argued not only that Copernicus’ heliocentric model was correct, but also that it agreed with the Bible, which, if interpreted correctly, included various heliocentric references. Copernicus’ best friend, Tiedeman Giese, Bishop of Culm, wrote in July 1543 a letter to Rheticus, in which he spoke with praise of this “little work by which you have skilfully protected the motion of the Earth from disagreement with the Holy Scriptures.”

According to Robert Westman’s recent reconstruction, there even existed plans, possibly shared by Copernicus himself, to include Rheticus’ treatise as an integral part of the first edition of *De revolutionibus orbium coelestium* of 1543. “With Copernicus’ death on the eve of the Council of Trent (1545-63),” Westman writes, “this brief gesture of philosophical and exegetical openness would go unheeded until second- and third-generation Copernicans independently revived Saint Augustine’s principle of accommodation more than a half century later.”

It is highly surprising to find Rheticus’ and Gorlaeus’ treatises published in a single volume, all the more as the publisher did not know Rheticus’ identity, whose important treatise he merely “appended” to Gorlaeus’ text, as the title page indicates. Furthermore, the two authors had nothing in common. Gorlaeus was no Copernican, while conversely, Rheticus was no metaphysician, let alone an atomist.

Obviously, given the rarity of this book, Rheticus’ work could not have had any greater impact than Gorlaeus’ *Idea physicae*. Moreover, as Hooykaas has pointed out, “in 1651 Kepler, Galileo and a host of theologians, philosophers and astronomers, Roman-Catholics as well as Protestants, had already tackled the problem,” and so Rheticus’ work may have seemed outdated.

The same may be said of Gorlaeus’ work: by 1651, a spate of other atomistic
works had been published and the northern part of Europe was in the grip of a
veritable Cartesiomania. Whatever novel idea Gorlaeus may have had back in
1610 would by then not only have been known from his *Exercitationes*, published
three decades earlier, but would moreover have seemed pale and stale compared
to Descartes’ or Gassendi’s metaphysics and physics. For this reason, the dramati-
cally belated publications of Gorlaeus’ and Rheticus’ two treatises were in reality
stillbirths.

In his short epistle to the reader, the editor explains that the two works had
never been edited before and had remained enclosed within private walls, but
that an eminent man had finally decided to present them to the public. Who
this eminent man was, and why he wished to remain anonymous, is a matter of
speculation. There is reason to believe, however, that both treatises came directly
from the library at Martenastate, the mansion in which Gorlaeus’ parents had
resided. There exists a possible family link between the Van Waesberge family and
the family of the wife of Carel van Gelder, who had been the executioner of the
will of David van Goorle, Sr.

Having examined the identity of the possible editors, publishers and printers
of Gorlaeus’ two works, we must also address an obvious question here, regarding
the author himself. Given his early death, the late publication of his two works
and the anonymity of their editors, why should we actually take it for granted that
the theology student David Gorlaeus was really their author and that they were
moreover written by the same person?

To begin with, as has been explained earlier, the two works display such a thor-
ough doctrinal overlap and so many stylistic similarities that there is no reason to
doubt that they are by the same author. But how do we know that this author was
David Gorlaeus? There are five reasons to believe in the veracity of his authorship.
First, as will be shown in chapter 3, there are important doctrinal overlaps between
the *Exercitationes* and the *Idea physicae*, on the one hand, and the teachings of
Gorlaeus’ teacher and landlord Henricus de Veno of the University of Franker,
on the other. Second, the final, incomplete section of the *Exercitationes* hints that
the author now studied theology, as reference is made to his academic “responses
given to passages in Holy Scripture.” Indeed, Gorlaeus had enrolled at Leiden’s
theological faculty a year before he passed away. Third, both works refer in a curi-
ous and chronologically helpful way to Galileo’s celestial discoveries. In the *Idea
physicae*, the respective passage reads as follows:

The Milky Way is no meteorological phenomenon, but the sheen of exceedingly
small stars, which because of their excessive smallness cannot be seen; this a cer-
tain mathematician from Padua testifies to have seen with the help of the newly
invented telescope.
Galileo’s *Sidereus nuncius*, which announced the telescopic resolution of the Milky Way into a myriad of individual stars, was published in March 1610. This gives us the *terminus post quem* of the composition of Gorlaeus’ two works. And yet, no one would have referred to Galileo in this manner around 1620. The passages under investigation were clearly written at a moment in which news regarding the recent telescopic discoveries reached the European centers of learning, but in which Galileo Galilei had not yet become a household name. Indeed, it is difficult to imagine that in the years following 1612 – the year in which Gorlaeus died – anyone would have referred to Galileo as “a certain mathematician from Padua,” not only because everyone would by now have recognized his name, but also because he had meanwhile become court mathematician and philosopher to Archduke Cosimo II de’ Medici. The fourth reason for believing in Gorlaeus’ authorship of the two treatises is that the unfinished state of the *Exercitationes*, with its provisional tacked-on conclusion, fits the concept of a posthumous publication better than that of a pseudonymous work. And finally, there is that 1641 testimony, partially cited earlier, by Gijsbert Voetius, who seems to have known the author and the circumstances of the genesis of his works intimately. Taken together, these five reasons point exclusively to Gorlaeus and no one else.

Having moved these questions out of the way, let us delve into the two books themselves and try to capture the essence of the ideas they contain. For the reasons mentioned above, our paraphrase will follow the structure of the *Exercitationes* and cite the *Ideae* wherever it either expresses the same thought in a more poignant way or adds something to the larger treatise.

### 2.3. Ontology as “First or Universal Philosophy”

Like all self-respecting authors of early modern philosophical textbooks, Gorlaeus first defines his terms. In keeping with the title of his *Exercitationes philosophicae*, he opens with the question, “What is philosophy?” All philosophy courses at the time began with this question, and they usually pondered a number of possible answers: ancient authors, Aristotle first among them, had sometimes identified philosophy with wisdom (*sapientia*) and sometimes with the quest for first, metaphysical knowledge; but usually, they settled for a general description, as did the Wittenberg natural philosopher, physician and atomist-to-be Daniel Sennert in 1600:

> Philosophy is an acquired power of the intellect (*habitus intellectus*), made up of wisdom and prudence, which contemplates everything and governs human actions in a congruent manner, enabling man to obtain the highest good.
But none of that is found in the Exercitationes, which offers a definition that is shockingly short and differs from the standard answer. According to Gorlaeus, philosophy is “the naked knowledge of beings.”

His book thus begins with a veritable bang: Gorlaeus identifies philosophy with ontology, the metaphysical discipline concerning “being as such.”

Abstract though such naked knowledge may seem, so Gorlaeus continues, it is of the highest importance to us as it leads us to a better understanding of God and provides an antidote against the misconceptions of our soul. Whereas theology teaches us how to reach paradise, “philosophy is the doctrine of how to perfect the human soul in this life.”

The human soul is in fact deficient in lots of ways: certain objects it cannot grasp because of their perfection (such as God), their imperfection (such as time, space and action), their greatness (notably the world) or their smallness (notably atoms). Philosophy, if reformed properly, will help us find our way out of our mental quagmire. In this operation of philosophical assistance, metaphysics plays the key role because, Gorlaeus explains, one of the main scourges of mankind is that our intellect labors under the problem of referentiality: our notions (notiones) do not correspond to things (res) as they really are. Fortunately enough, however, philosophy can help greatly in improving this situation, notably by teaching us how to discern between existing and non-existing beings and their modes.

In fact, philosophy can be compared to a kind of doctor’s kit, because for each human deficiency there exists a corresponding branch of philosophy that may cure it. Ethics, for example, helps us to mend the imperfections of our will, whereas the illnesses of the intellect are tackled, if practical, by mathematics, and if theoretical, by a type of “logic” that is in truth a “science of being” (entis scientia).

As we shall see below, Gorlaeus’ teacher Henricus de Veno regarded man’s limited intellectual capacities as a consequence of original sin. Gorlaeus does not explain our mental inadequacy in theological terms, but merely points to the inadequacy of our senses with respect to reality and the mistaken terminology that result from this mismatch. He does, however, like other authors in his day and age, subscribe to the notion that it was in man’s power to improve his epistemic and moral stature through philosophy and to obtain greater perfection. This idea is for example very prominent in the work of Francis Bacon, most notably in his treatises On the Proficience and Advancement of Learning, Divine and Human (1605) and the Instauratio magna (1620). As Stephen McKnight has stressed, Bacon’s program “is not a secular, scientific advance through which humanity gains dominion over nature and mastery of its own destiny. Bacon’s instauration is a program for rehabilitating humanity.”

This attempt at self-rehabilitation and, as Bacon called it, a self-governed return to “the first state of creation,” smacked, as Passmore has pointed out, of Pelagianism: the heresy that attributed to humans the possibility of freely choosing between good and evil. Although in Gorlaeus
we encounter no comparable promise of a scientific return to pristine knowledge, his notion that philosophy can “cure” the shortcomings of our senses, perfect our souls and improve our knowledge of God takes us in the same direction. We shall see later why the theological implications of this position are important. In a nutshell, for an opponent of Gorlaeus’ philosophy like Gijsbert Voetius, it was wrong to place understanding before faith or to view it as a precondition or even a helpful instrument: “Human reason is not prior, better known, or more certain than faith; hence reason cannot be its principle.”

As for Gorlaeus, this “science of being,” which provides such salubrious medicine to the soul, encompasses in turn a number of sub-disciplines. The first of them, called *theosophia*, deals with the divine being and “the nature and attributes of God.” However, the premises of this discipline must not, so Gorlaeus warns us, be Aristotle’s, but the Bible’s. We shall see in chapter 3 that by collocating the treatment of God’s nature and attributes within the discipline of philosophy, Gorlaeus took a highly controversial step, and one that would at the time be understood as a sign of his sympathies for the Arminian cause and in particular for the treatise *On the Nature and Attributes of God* of the embattled theologian Conrad Vorstius.

The two other sub-disciplines of this “science of being” take care of created things: *angelographia* deals with supernatural beings, and notably angels, as the name suggests; and *physica* deals with natural beings. This brief and underdeveloped division of philosophy may echo views formulated in Bartholomaeus Keckermann’s *Scientiae metaphysicae compendiosum systema* of 1609 and Otto Casmann’s *Angelographia* of 1605.

Given Gorlaeus’ ontological approach to the subject matter of philosophy, it should not surprise us that his definition of *physica*, too, differs considerably from the standard Aristotelian definitions. *Physica* – a term that was at the time used interchangeably with *philosophia naturalis* (‘natural philosophy’) – was in textbooks from that period routinely “defined as a speculative science which studies the world of changing material things – celestial and terrestrial, animate and inanimate – culminating in the study of man.”

While the standard definition thus insisted that natural philosophy (or physics) studied nature inasmuch as it was subject to change, Gorlaeus’ *physica* dealt with unchanging beings. “For nature is something absolute” (*absolutum quid*), our author explains; it is a rigid composition of unchanging beings. Once again, it is fair to say that his is certainly quite an unusual standpoint. Aristotle, who supposed the word *physica* to be cognate to the verb ‘fuein’ (‘to grow’), had understood physics to be a discipline dealing with change and development. Indeed, the entire Aristotelian approach to natural objects had throughout the centuries consisted in considering all natural objects as subject to processes of mixing and unmixing, growth and decay, as well as of unfolding from a potential towards an actual state.
Gorlaeus was fully aware that his approach and his terminology were at odds with those of his contemporaries. He even admitted to his difficulty of finding a suitable name for his new, general science of being. In the end, and “for the time being,” he chose to call this discipline the “first or universal philosophy.”

He hastily added that we must not confuse this *prima philosophia* with Aristotle’s metaphysics. The term ‘meta-physics’ refers precisely to those Aristotelian books that were to be placed after (‘meta’) those on physics. By contrast, Gorlaeus insists that his own ‘first philosophy’ precedes physics in the order of the disciplines. As far as he is concerned, traditional metaphysics could simply be expunged from the scheme of philosophical disciplines, as it referred to nothing more than to a bagful of disparate topics.

Having defined the parameters of his universal philosophy, Gorlaeus begins to lay down its principles, and he does so by introducing the following two distinctions. Following a traditional division, he first distinguishes *entia realia* from *entia rationalia*, where “real beings” mean those whose being (*esse*) is rooted in their independent existence (*existentia*), while “rational beings” depend for their *esse* entirely on the human intellect. More innovative is, by contrast, his separation between the *ens per se* (“being by itself”) and the *ens per accidens* (“being by accident”), also called *ens per aggregationem* (“being by aggregation”). The *ens per se* is an ultimate, self-supporting unit, while the *ens per accidens* or *per aggregationem* refers to an entity that only appears to be an independent unit while it is in fact, as its name indicates, a mere aggregate of several *entia*.

But here, we must take note of the conspicuous list of cases Gorlaeus offers us of such “accidental” or “aggregate beings”: (i) a heap (*acervus*) of stones, where the contributing beings “touch each other only confusedly”; (ii) the world (*mundus*), whose beings touch each other “in some order”; (iii) water drops merging in a river, or a puddle, i.e., beings of the same quality joining to form a larger entity. Finally, and most controversially, (iv) there exist cases

where one [entity] is intimately in the other, penetrates it, and acts through it, as the soul does in the body. Although various beings are joined here, they will yet together always form an entity by aggregation. Nor does their union change the essence of the things in such a way that from two things, a numerically single thing might come about.

This is a remarkable list indeed. We must recall that Aristotle, and following him all of medieval and early modern school philosophy, had insisted on the distinction between a true mixture (*mixtio*) and a mere ‘heap’ (*acervus*): by ‘mixture’ was meant a genuine fusion of heterogeneous parts into a new homogeneous unity, which was defined by a single form (the so-called *forma mixti*); whereas a ‘heap’
designated a mere aggregate of spatially juxtaposed, but unmixed, parts.\textsuperscript{44} In classifying all compounds as aggregates and by insisting on the continuing independence of the contributing beings, Gorlaeus sides with an essentially atomist conception of nature. Only an atomist will view a body of water as an \textit{ens per accidens} made up of individual water units, rather than as an infinitely divisible continuum.

The most remarkable aspect about Gorlaeus’ list of \textit{entia per accidens} is however his definition of man as a composite being. As we shall see in chapter 4, it is a definition with a remarkable earlier and later history. Gorlaeus took it from Nicolaus Taurellus’ \textit{Triumphus philosophiae} of 1593, while Henricus Regius, in turn, was to lift it out of Gorlaeus several decades later, letting a student defend it in a disputation in 1641. This triggered Gijsbert Voetius’ violent anti-Cartesian reaction, which led to the prolonged Crisis of Utrecht and to the official condemnation of Cartesianism.\textsuperscript{45} It is a tenet that Pasnau has called a “shockingly explicit version of Platonic dualism.”\textsuperscript{46} Although Gorlaeus nowhere cites Plato, his view entails, in his own words, that

in a human being, there is a soul and also a body, and these two are united in such a way that the body is made the soul’s residence, vehicle, and instrument through which the soul exercises its operations. But these two are not made into one being, called a human being. Instead, each retains its complete and perfect essence, by which it is what it is. Still, the human being is not the same as the soul, nor the same as the body; rather, it is the same as the soul and the body taken together and aggregated. If, however, the human being is to be considered not as a being by aggregation, but as one thing \textit{per se}, then it will be the same as the soul existing in the body.\textsuperscript{47}

The reasons that may have persuaded Gorlaeus to accept Taurellus’ view will be discussed below. But one theological argument is offered in the \textit{Exercitationes}. It has to do with death and resurrection: from Sacred Scripture, I learn that

\begin{quote}
I wish to dissolve and be with Christ. But if the composite [of body and soul] is one being, and man is a composite, then it is necessary that in death, man’s essence perishes, because that being which is a composite disappears. How, then, can that which is not a being be with Christ? And how could death be called a dissolution, if it is instead a corruption of the substance? But should one call disappearance, what is merely dissolved? Since this is clearly not a coherent view, we bid farewell to this Peripatetic nonsense and follow the sacred truth.\textsuperscript{48}
\end{quote}

We have encountered this very Platonic idea of man as a merely temporal composite of soul and body already on Gorlaeus’ tomb! “This very illustrious mind
and heavenly spirit, / Freed from its fetters and the weight of the body, / Sought the Havens, whence had come its seed.”

One wonders whether the tombstone and Gorlaeus’ argument here are in any way related; was the author of the epitaph familiar with Gorlaeus’ philosophical views? Did Gorlaeus write his own epitaph?

But we must return to the argument. It is obvious that Gorlaeus adamantly defends a view according to which nothing ever changes. Souls do not change, atoms do not change; and when they enter into a temporary collaboration, forming human beings for the duration of their lifetime, they certainly do not merge into something different but remain distinct units. According to Pasnau, this “strict permanence thesis […] seems to have been given its first sustained post-scholastic defense by David Gorlaeus,” who wished to replace Aristotle’s hylemorphism “with an atomism that insists on strict permanence.” Indeed, unless God creates something out of nothing, there is no way in which something new can come about: “I deny,” Gorlaeus writes, “that any body has been changed into another, or that it can be changed.”

The straight link between the imperishable and immutable ens per se and Gorlaeus’ atomist ontology becomes even more evident when we look at the general description the Exercitationes offers of the ultimate unit of being (ens). Each ens, its author decrees, must exist actually (in actu) – unlike Aristotle’s substances, which can also exist potentially (in potentia). Indeed, Gorlaeus decries all scholastic talk of potency as muddle-headed. In this, he is the radical heir of a long tradition that ultimately goes back to William of Ockham (c. 1288-c. 1348), for whom an ens was a concrete singular thing (ens singularis). Two centuries later, Lorenzo Valla (1407-1457) insisted that “being” (ens) was the same as “what is”; “what is” was the same as “that which is”; and “that which is” what the same as “this thing.” Again almost two centuries later, we now find Gorlaeus insisting that all entia possess unchangeable essential properties, and that existence is one of them. In fact, “essence” and “existence” coincide.

Although the label ‘nominalism’ had a different meaning for each generation ever since it was first used in the fifteenth century, Gorlaeus clearly thought of himself as a nominalist. He self-confidently battles for this view with what he took to be nominalist weaponry, exclaiming (according to F.A.H. Peeters’ scrupulous count) a full seventeen times in the Exercitationes and five times in the Idea physicae that “beings must not be multiplied beyond necessity.” He valiantly, and sometimes recklessly, wields Ockham’s razor as an “Achillean defender of our doctrines.” As far as the issue of universals is concerned, his self-description as a nominalist is certainly correct, according to the standards of his time: “All that exists in re is one by number and singular,” he insists. Universals, by contrast, are mental abstractions, which establish their reference through what would nowadays be called ‘indexicals’, that is to say, by pointing to a singular “this, here, now.” In
the material realm, these units are physical atoms in the traditional, Democritean sense.\textsuperscript{57}

In his \textit{De principiis et originibus}, which was written in the 1610s but published in 1653, Francis Bacon wrote:

\begin{quote}
But a principle is not an entity, and a mortal entity is not a principle. A clearly irresistible necessity therefore drives men’s thoughts (if they want to be consistent) to the atom, which is a true being (\textit{ens}), having matter, form, dimension, place, resistance (\textit{antitypia}), appetite, motion and emanation. Likewise, amid the destruction of all natural bodies, it remains constant and eternal. For since the corruptions of the greater bodies are so many and various, it is absolutely necessary that that which remains as an unchanging center should be something either potential or extremely small.\textsuperscript{58}
\end{quote}

Gorlaeus’ \textit{ens} has a number of properties in common with Bacon’s, but there are also various important differences. First, from the way in which it is introduced in the \textit{Exercitationes}, Gorlaeus’ atomism is in the first instance metaphysical. Moreover, his category of \textit{ens per se} not only includes material atoms, but also God and angels. Bacon’s atomic \textit{ens} designates that unshaken material unit that survives unharmed whatever vicissitudes the larger physical bodies are subjected to, but which also possesses active, indeed vital properties. Gorlaeus, by contrast, presents us with an entity that can be divine, spiritual or material. Obviously, the inclusion of non-material beings cannot but have profound implications for the category of \textit{ens per se}. For whenever our author goes about defining its qualities, he invokes what might legitimately be called a ‘God criterion’: any attribute of the \textit{ens}, even when this \textit{ens} is a material atom, must also hold true for God.\textsuperscript{59} The application of this ‘God criterion’ explains the choice of the following essential properties of all \textit{entia}: “unity, truth, goodness, existence, locality, durability.”\textsuperscript{60} But obviously, the ‘God criterion’ also works the other way around: what is true of the atom must also hold true for God. The resulting physicalization of God is by no means an innocent or unwanted consequence of Gorlaeus’ metaphysics. We shall see below, in chapter 3, that it is in accordance with the theologian Vorstius’ controversial ontological treatment of God and his attributes.\textsuperscript{61}

As for ‘unity’, Gorlaeus takes this property to include ‘quantity’, too, which in his eyes is not an accident but “is the same as substance,” because both \textit{quantitas} and \textit{ens} are rooted in numerical unity. “Just as unity is not distinct from what is one, so the quantity of the atom is not distinct from the atom itself.”\textsuperscript{62} When three atoms join up, they therefore form a ternary number, not a single continuum. Just like Giordano Bruno a few years before him, Gorlaeus thus understands by the “quantity of an object” nothing over and above the number of its atomic components.\textsuperscript{63}
Besides these essential qualities, beings also possess contingent modi, which describe their disposition (habitudo) within the parameters of time and space (rest, speed or duration) and also their relative spatial position as, for example, the location of a given atom with respect to the others. Helen Hattab has recently individuated in Gorlaeus’ replacement of the scholastic attributes by modi a direct model for Descartes’ similar enterprise. She concludes:

Unlike prior anti-Aristotelian philosophies such as those of Bruno, Telesio, and Basson, Gorlaeus’ metaphysics involves the complete rejection of the Scholastic Aristotelian substance/accident ontology in favor of a substance/mode ontology. [..] His account of modes and his identification of substance with extension/quantity logically commit him to the view that all the properties of body are modes of extension well before Descartes develops his metaphysics.

While the modi thus defined seem useful for the description of a complete atomistic system, Gorlaeus also introduces a further, somewhat unexpected and in fact rather awkward category, namely “real accidents” (accidentia realia), a type of ens that has “less perfect being” because it leads a merely semi-independent life. ‘Real accidents’ must always inhere in a subject (which is why they are ‘accidents’), but they can also migrate from one subject to another (which is why they are both ‘real’ and also entia). They are furthermore endowed with limited causal powers, for they can produce other accidents. In fact, Gorlaeus explains a great number of physical phenomena – color, rarefaction, lightness, etc. – in terms of the “accident of heat,” which multiplies itself across contiguous elementary atoms.

Although one may encounter ‘real accidents’ in various early seventeenth-century philosophers, it is hard to deny that this theory of ‘real accidents’ disturbs the coherence of Gorlaeus’ atomistic explanations. One intuits that our author simply wants to eliminate Aristotelian potencies or powers, and to redefine qualities as the essences of autonomous beings: “Just as we have said that quantity does not differ from the quantifiable body, so we also say that no potencies, indeed, no properties are distinct from the essence of a thing. They differ solely by our reason and manner of conceiving them.” This view has been described as a “nominal conception of power,” in the Lockean sense of the word, meaning that “the substance itself is capable of whatever operations are ascribed to the powers.” But whereas most later seventeenth-century corpuscular thinkers, and certainly John Locke, would follow in the footsteps of Plato’s Timaeus and explain sensorily perceived, so-called ‘secondary’ qualities in terms of the geometrical or ‘primary’ shapes of corpuscles, Gorlaeus’ doctrine of migrating ‘real accidents’ bars this type of geometrical reductionism and the mechanical understanding of sense perception that usually accompanied it. Surprisingly, in fact, our philosopher displays
the utmost indifference with respect to the explanatory possibilities offered by postulating specific atomic shapes, preferring to “leave this question unresolved.” For him, the two most important qualities “inhere” in the atoms, of which they constitute the essence, while the others are the result of the structure formed when several atoms gather.

These two essential qualities are humidity (for water) and dryness (for earth). They are not due “to the congregation of atoms, but exist in the atoms themselves: for if the singular atoms were not dry, the entire body could not be dry.” Hot and cold, Aristotle’s other two primary qualities, are by contrast ‘real accidents’. They migrate from one subject to another and are therefore the essential properties of none. All remaining qualities are mere modi, to be explained as the product of atomic aggregates.

In contrast to the migrating ‘real accidents’, which are hard to integrate into any kind of atomist program, however defined, these modi take us in the direction of molecular notions developed fully by other seventeenth-century authors. “Rarity, density, lightness, roughness are similar modi, not real qualities,” Gorlaeus writes, “for they are nothing else but the positions of parts.” Interestingly, when he allocates different properties to these two different levels of concretion – atoms per se and conglomerates per accident, as it were – Gorlaeus invokes chemical experiments, of which he writes that they manage to change only certain qualities, but not others.

2.4. Gorlaeus’ Physical Atomism

“The [exercises] regarding general being (ens in genere) and its accidents, with which we have so far been dealing, have been fairly exhausting and difficult,” we read on page 221. Only in the twelfth exercise, that is, only two-thirds through his treatise, does Gorlaeus leave the explanation of his ontological ‘first philosophy’ so as to enter into the field of physics proper. Understandably, historians of science have focused on the last third of the book, but our summary should have made it evident that Gorlaeus’ physical atomism presents itself as the logical by-product of his general atomist ontology.

The physical part of his treatise begins with a refutation of the two constitutive principles of Aristotelian hylemorphism, namely matter and form, and with their replacement by unchangeable corporeal atoms. The existence of these atoms, Gorlaeus declares, cannot only be logically derived from metaphysical principles, as has been done in the first two hundred pages of his work. Atoms can also on rare occasions be perceived by our senses. For example, “who would not believe that those minute parts of water vapor are indivisible?” As for Aristotle’s counter-pro-
posal to atomism, which relied on substantial forms possessing the power to turn different materials into a single homogeneous substance, Gorlaeus protests that it contradicts all principles of good philosophy. First of all, “which reason forces us to multiply beings unnecessarily?” 79 Once again, it is Ockham’s razor that is employed to shave away the Peripatetic vocabulary. At the same time, however, Gorlaeus is fully aware of Aristotle’s main argument against the possibility of physical atoms, which is that they put an arbitrary limit to the divisibility of an extended body. He responds to it rather elegantly by distinguishing between ‘quantity’, on the one hand, and ‘divisibility’, on the other, and thus between physical atoms and geometrical lines. 80 Throughout the seventeenth century, atomists and anti-atomists quarreled over the legitimacy of separating physical from mathematical divisibility. Take, for example, the alchemist Andreas Libavius (1555-1616), who in his Alchemia triumphans of 1607 claimed, albeit in an intellectually reckless manner, that Democritus had been a chemist and that his atoms referred to the principles found in the chemical resolution of bodies. To his detractors who retorted that all extended bodies had to be indefinitely divisible, Libavius replied that they failed to grasp the difference between mathematical extension and the atomic make-up of natural substances. 81 In the eyes of seventeenth-century natural philosophers, the problem remained, however, unresolved. While the atomist Pierre Gassendi, a number of decades after Libavius, accepted this distinction, his countryman René Descartes wouldn’t, positing the indefinite divisibility of all matter and therefore also of the corpuscles that he invoked to explain physical phenomena. 82

It has been mentioned above that according to Gorlaeus’ natural philosophy, there exist only two essential qualities, namely, dry and humid. Aristotle’s system, by contrast, features four such qualities, in addition to dry and humid, there are also hot and cold, and their binary combination explain the existence of precisely four elements. Fire is defined by the qualities hot and dry, earth by dry and cold, water by wet and cold and air by wet and hot. These four elements are furthermore defined by their motion: whereas earth is heavy and tends downwards and fire is light and rises, water and air lie in between. There is also that fifth element, ether, which has no upward or downward drive, but moves circularly: it is the element that defines the superlunary sphere of eternally regular circular motion.

As we shall see presently, Gorlaeus does not only reject this ether, and with it the venerable distinction between sublunary and supralunary regions, but his elimination of the two primary qualities of hot and cold entail a reduction of the sublunary elements from four to two. In fact, he only acknowledges earth and water as elements, devoting a considerable number of pages to eliminating the other candidates. His main reason for maintaining a two-element doctrine is this:
Elements are said to be those things out of which the mixed bodies are composed and into which they are again reduced. [...] But we experience that the mixed bodies, which perish, are resolved into earth and water. [...] For there is no mixed body that is resolved into fire or air.83

More specifically, fire cannot mix with water, nor do we eat and digest it; for these reasons, it cannot be a component of our bodies.84 In reality, fire is but an accident: it can be caused, for example, by the friction of closely packed atoms. That it is nothing but heat can be proven by the fact that when the sun shines, the air gets warm, and when we bundle sun rays through a burning glass, fire will manifest itself “to sight and touch.”85 Nor is air an element.86 In contrast to fire, however, Gorlaeus does not place air in the category of accidents but accepts it as a real substance – which, as we have seen before, fills the entire cosmos. It is of course more than doubtful whether his ontology allows for any such type of simple non-elementary substances. The reason for its unique and very peculiar status is that, while being an independent sort of substance, it cannot mix with either water or earth, because “air cannot depose its secondary qualities and assume others.”87 Such a capacity, as we have seen, constitutes for Gorlaeus the precondition for mixing. However, air is found in the pores of all mixtures, where it retains its nature intact. As a matter of fact, our author needs air not only as a universal filler of void spaces (because he allows for no vacuum), but also as the ubiquitous carrier of the ‘real accident’ of heat. By nature neither hot, cold, wet or dry, air passes celestial heat down to the two elements of water and earth, thereby triggering off mixtures, generations, and corruptions.

So, what exactly happens according to this model when the only two real elements, namely atoms of earth and water, mix?

We believe that each and every part has its own essence before entering into any composition, and preserves it in it, and that [in mixture] no numerically single entity is produced, or that one ens is made out of them, but that they unite and mix so that one continuum is produced, which is one aggregate being (ens per aggregationem), but not by essence.88

This is not a particularly clear standpoint. On the one hand, Gorlaeus is here found arguing against Aristotle’s definition of mixture as the production of a new homogenous substance. On the other hand, he also seems to betray the basic intuition of atomism by claiming that “one continuum is produced.” How exactly should we imagine a mixed body that is at the same time an ens per aggregationem (since the contributing atoms retain their separate identities) but also forms a continuum? His answer is as follows:
For the minimal bodies are the atoms, which are mixed in various ways. These must touch each other mutually. For if they did not touch each other, how would one body arise [from them]?\(^8^9\)

Mixing, in other words, is both mutual contact and union. When atoms touch each other, they exchange their respective qualities with one another, bringing about a shared set of properties. This sharing, in turn, guarantees the appearance of the mixt as a ‘continuum’\(^9^0\). In proposing this view, Gorlaeus explicitly followed in the footsteps of the well-known sixteenth-century Italian physician and natural philosopher Julius Caesar Scaliger (1484-1558). Scaliger, who was loved as much by Protestant scholastics as by their detractors, was incidentally the father of the equally famous Joseph Justus Scaliger, the humanist and professor at Leiden University (1540-1609), who died only three years before Gorlaeus. Scaliger père’s very popular and frequently reprinted *Exercitationes exotericae* of 1557 purportedly defended Aristotle’s physics against the pernicious innovations of his colleague and rival Girolamo Cardano; in truth, however, it introduced a whole range of conceptual innovations. Among the most successful innovations was his novel definition of mixture.

Aristotle had provided a definition of mixture that had become canonical. In Latin, it reads: *Mixtio est miscibilium alteratorum unio.*\(^9^1\) Literally, this means: “Mixture is the union of mixable bodies that have been altered.” According to Ingemar Düring, such a literal translation does not do justice to what Aristotle wished to convey. In fact, these “five words require 19 words to render them: ‘Chemical combination is a unity of bodies, capable of such combination, whose constituent parts have undergone a thorough transformation.’”\(^9^2\) The result of this chemical ‘transformation’, at any rate, is a new substance characterized by its specific form, the so-called ‘form of the mixt’ (*forma mixti*).

In his very influential reformulation of that definition – a reformulation that incidentally possesses an as yet unstudied prehistory in medieval medicine – Julius Caesar Scaliger stated that mixture was “the motion of minimal bodies towards mutual contact so that a union comes about.”\(^9^3\) Many early-seventeenth-century atomists, including Sébastien Basson, Daniel Sennert and Joachim Jungius, eagerly seized this definition and gave it an atomist twist. This is exactly what Gorlaeus does, too – but at an earlier date – when he first quotes Scaliger’s definition and then adds the following clarification: “By minimal bodies I mean indivisible atoms.”\(^9^4\)

This reliance on Scaliger, however, comes at a certain cost. His notorious doctrinal inconsistencies notwithstanding, Scaliger was no atomist, but, if anything, a minimist. The technical niceties of this distinction need not detain us here; suffice it to say that those early modern scholastics who developed Aristotle’s sketchy and
controversial allusions to ‘natural minima’ into an explanatory tool did normally not think of these minima as atoms; that is, as independent, self-subsisting beings. Rather, they understood minima as the lowest limit of a quantity of matter capable of maintaining a certain substantial form. Put differently, they regarded both natural minima and maxima as limits, not as things. For this reason, they posited a natural minimum for every substance. Gorlaeus, by contrast, like all genuine atomists, could only permit the existence of as many types of atoms as there were basic substances and elements; of which, as we have seen, he acknowledged three, namely the two elements of earth and water, and the non-elementary substance of air. For this reason, his attempt to build on Scaliger’s doctrine of mixture and of minima took the risk of ushering in a confusion between the different types of logical reasoning behind atomism and minimism. And in fact, Gorlaeus occasionally gets caught in this conceptual trap, for example when he declares that there are minima of sand just as there are minima of water. If you are a minimist, this is of course correct; but if you subscribe to Gorlaeus’ doctrines, it is not, as you would have to define sand particles not as entia per se, but as merely accidental mixtures of earth and water atoms.

The problem of the explanation of mixture and the new properties that emerge in the process of mixing takes us straight to a problem concerning which both Aristotelian natural philosophy and atomism seemed to be at a loss. The issue is the same, irrespective of whether one postulates four elements, as the Peripatetics did, or a small number of corpuscular types, as Democritean atomists did, and it is the following: if one assumes that mixed bodies are the result of a combination of no more than four elements, how is one to explain that these display so many different and such radically new properties? How can earth, water, air and fire mix once into drinkable milk, another time into poisonous arsenic, life-giving blood or unbreakable diamonds? Aristotle had proposed that the mixture of elements implied the blending of the various elementary qualities and the concomitant emergence of what he called a common ‘temperament’. However, his explanation seemed insufficient to clarify, for example, how it was possible that blending non-toxic elements could possibly end up giving rise to a toxic ‘temperament’. The super-addition of a substantial form (forma mixti), which characterized the new homogeneous mixture, was therefore required. But where did this new form come from? Was it the automatic result of the temperamentum, or was it in some other way ‘deduced from the matter’, as this process was sometimes called? Or was it instead in some way dependent on external influences such as the heat of the sun or stellar rays? This question, which Aristotle himself left in the middle, remained at the center of a drawn-out, yet unresolved, controversy; so much so that in the course of the seventeenth century, the very concept of a forma mixti could become a matter of ridicule and a cherished proof of the vacuity of scholastic terminology.
But to laugh at the *forma mixti* was easier than to replace it. Seventeenth-century atomists, who in this were partly following the lead of such ancient atomists as Lucretius, felt forced to invent hooks and spirals, minuscule chains and wedges as well as magnetic poles in equally futile attempts to explain such emergent properties as liquidity, sweetness, redness, toxicity and so forth by means of adventurous combinations of geometrical shapes.

As for Gorlaeus, he attempted to address this complex problem with the conceptual tools that he thought were at his disposal. As mentioned before, he explained many of the emergent properties of mixtures in terms of the *modi*, that is to say, the reciprocal position of atoms. But he apparently sensed that he could not reduce all qualities to such merely spatial arrangements. We recall that spatial contiguity of parts was for him only a precondition of mixing. When atoms touch, so he thought, they exchange their qualities and bring about a certain qualitative union. We recall from above that his particular explanation involves ‘real accidents’, these travelling qualities of hot and cold, which are said to interact with each other in such a way that one ‘middle quality’ or *temperamentum* is produced among the intermingling atoms. Whenever outside influences disturb this ‘temperament’, the body will once more resolve into its original components. In sum, then,

in mixture, heat and cold function as the efficient cause, while humidity and dryness are the material cause. And thus arises the temperament, which is nothing else than the due proportion between their four qualities.

This doctrine recycles the traditional idea of the common *temperamentum* arising in homogeneous mixts, only that this ‘temperament’ is now explained by means of spatially contiguous atoms sharing qualities and real accidents rather than by means of elements dissolving into a new continuous mixt. Several commentators have viewed this doctrine as a sign of half-heartedness and of a pusillanimous quivering half-way between scholasticism and a fully mechanical conception of nature.

This criticism is, in my view, mistaken. Had he wished to do so, Gorlaeus could have easily subscribed to the geometrical type of atomism that Aristotle or Diogenes Laërtius sketched in their descriptions of the philosophy of Leucippus and Democritus, which Epicurus expounded in his extant fragments, and which Lucretius had exhaustively illustrated in his *De rerum natura*. If he hesitated to do so, this should not be explained merely by his membership in an allegedly transitional generation of thinkers who had not yet collected enough mental strength for a full rupture with ‘the Philosopher’. Rather, one should keep in mind that not one single seventeenth-century ‘atomist’ was fully persuaded by the atomistic
model provided by the ancient sources. The first atomist to make this clear was Giordano Bruno, who on the one hand imitated Lucretius’ verse and made engravings to illustrate the stacking of Democritean atoms, but who on the other hand explicitly stated that “atoms and the void are not enough” to explain natural phenomena and endowed his atoms with vital forces. The same holds true of Francis Bacon, who, despite his admiration for Democritus’ philosophy, felt that the properties and behavior of bodies could not be explained through their shape, motions, collisions and entanglements alone. By the same token, even when turning his back on Aristotle, the German physician, philosopher and chemist Daniel Sennert did not espouse a materialistic version of atomism, but decided to maintain the old substantial forms which he now located in his atoms. With respect to his doctrine of mixture, I think we have reasons to comprehend rather than to deplore Gorlaeus’ reluctance to embrace the naked geometrical materialism of ancient atomism. Like most seventeenth-century atomists, Gorlaeus too felt that the generation of new qualities in chemical mixture had to involve more than a merely spatial gathering of atoms, and that the atoms contributing to a mixture must at least be partially transformed and homogenized so as to generate the “qualities that bind the parts together in unity.”

Let us return now to the overall scheme of Gorlaeus’ theory of the elements. We have just seen that in what used to be Aristotle’s sublunary world of ‘generation and corruption’, he abolishes two of the four traditional elements and redefines mixture in atomistic terms. Even more radical, however, are the consequences of his decision to abolish also the fifth element, ether. In what contemporaries perceived as an important doctrinal novelty, he combines Holy Scripture with evidence provided by the sciences to rule out the existence of the ether and to insist that the whole cosmos is filled with the same matter. In doing so, he denies the central Aristotelian distinction between two physical realms, namely a sublunary world defined by the four elements, rectilinear upward and downward motion as well as by constant coming-about and perishing, and a supralunary realm defined by the element ether, by circular motions and by the constancy and incorruptibility of the planets and stars, which were attached to crystalline spheres. The elimination of this distinction constituted one of the most important ingredients of, and indeed preconditions for, the advent of the seventeenth-century’s new sciences. In this respect, Gorlaeus shows himself to be aware of the requirements that physics had to fulfill in the age of Nicholas Copernicus, Tycho Brahe, Johannes Kepler and Galileo Galilei. After all, if the location of the Earth was no longer conceived to coincide with the center of the universe, but as lying on a planetary orbit around the sun, the traditional layering of elements up to the moon no longer made any sense. In fact, one of the most glorious chapters of seventeenth-century science between Kepler and Newton contains the story of the cosmologically driven overhaul of physics and astronomy.
Gorlaeus’ rejection of the difference between sublunary and supralunary physics is an integral part of this glorious chapter in the history of science. In fact, that he put it down on paper as early as c. 1611 is remarkable, since most Dutch university courses continued to teach Aristotelian cosmology for some decades to come. It is when dealing with this issue, more than in any other part of his book, that one notices Gorlaeus’ acquaintance with contemporary research in optics and astronomy. For example, in order to prove that the heavens are not filled with ether, but with air, he invokes “the shared conviction (dogma) of opticians that different diaphanous media generate refraction.” But since such refraction and the concomitant displacement of sun, moon and stars is only demonstrated “in the lower region of air, because of vapors and exhalations,” and not elsewhere, it follows that there exists no other medium in the heavens than air. Equally interesting is Gorlaeus’ astronomical argument against the existence of celestial spheres, to which the planets were traditionally assumed to be affixed: “Besides, the observations of astronomers (mathematici) show that comets appear in the heavens themselves.” This remark contains an obvious reference to Tycho Brahe’s measurements of the Great Comet of 1577, which proved that comets were not meteorological phenomena, occurring in the region between the Earth and the Moon, as standard theory had it, but that they traversed the orbits of the planets in the superlunary region.

But if the planets and stars are not attached to any crystalline sphere, how then do they move? Gorlaeus proposes a hydrological solution: “The heavens are a continuous body, which does not move, but is quiet. The stars themselves move in it freely, in the same way in which fish swim in water or rather how clouds are carried about in the air.” Although the theory of the fluidity of the heavens is found as far back as in Ptolemy’s Hypotheses of the Planets, it had become a minority view in the Middle Ages. It was only after Tycho Brahe had demonstrated the impossibility of rigid celestial spheres that the comparison of the heavens with an airy or watery liquid and of stars with birds, fish or clouds had become once again prominent. With his view on this matter, Gorlaeus is found in good company with authors as diverse as Robert Bellarmine, Tycho Brahe or Johannes Kepler.

The most probable source of Gorlaeus’ acquaintance with up-to-date optical, mathematical and astronomical knowledge as well as cosmological issues is Adriaan Metius (1571-1635). In 1594, Metius had been one of Tycho Brahe’s assistants on the Island of Hven. Four years later, he accepted a professorship at the university of Franeker, where Gorlaeus took his Arts degree. There, he taught mathematics, astronomy, surveying, navigation and fortification. That the technical insights and theories that Metius had brought back from Tycho’s island became common knowledge in the university of Franeker’s scholarly community appears from the disputations held under the auspices of Henricus de Veno, professor of natural philosophy and ethics as well as Gorlaeus’ teacher and landlord, which will be examined below.
The most recent celestial astronomical discovery that Gorlaeus refers to in his two books has already been mentioned: it is his reference to the telescopic observations announced in Galileo’s *Sidereus nuncius* of 1610. Surprisingly enough, however, he only mentions the optical resolution of the Milky Way into a myriad of stars, which proved its supralunar nature and disproved notions that it was a sublunar, meteorological phenomenon. By contrast, no word is said about Galileo’s discovery of the earth-like surface of the moon or of Jupiter’s four moons. Nonetheless, despite its brevity and restraint, this reference constitutes the earliest known testimony to Galileo’s impact on the intellectual life in the Netherlands. It shows that Gorlaeus, despite his otherwise inconspicuous reliance on the results of the empirical sciences, took an interest in, and had access to, some of the most recent discoveries and theories, at least in the domain of astronomy.

At the same time, it must be mentioned that the *Exercitationes* does not show any trace of Copernicanism. Quite to the contrary, Gorlaeus explicitly combats this view in a specific section entitled “The terrestrial globe does not move.” This section illustrates however his awareness of the chief arguments in favor and against a heliocentric cosmology. Particularly interesting is his paraphrase of the Copernicans’ response to heliocentric passages contained in the Bible: “To the places in the Holy Scripture, they respond that the latter speaks about motion, not how it is in itself, but how it is conceived by us.” Which Copernicans he may have had in mind, he does not say – but the most fascinating possibility is of course that he knew of the treatise of Rheticus, whose manuscript was kept at the Martenastate, where Gorlaeus grew up, before it was published, together with Gorlaeus’ own *Idea physicae*, in 1651. Judging by the evidence assembled in Rienk Vermij’s study of the reception of Copernicanism in the Dutch Republic, there were exceptionally few Copernicans to be encountered in the Netherlands in the days when Gorlaeus wrote his treatise, although there were a handful of humanists interested in the Tychonic system and a small number of others who examined, but rejected, Copernicus’ system. Not even “the telescopic discoveries by Galileo” managed at first “to elicit a noteworthy reaction at the university,” as Vermij shows.

Gorlaeus’ decision to dedicate a section to the discussion of the motion of the Earth is, in this respect, certainly remarkable. However, after deploring the absence of demonstrative proof on the part of the Copernicans, he lists the standard reasons for rejecting the assumption of the Earth’s motion: (i) it contradicts the natural motion of the element earth, which is rectilinear; (ii) it is inconceivable that one should not feel such a motion; (iii) a stone thrown up into the air would have to land elsewhere and not descend to the same place.

We may conclude, then, that Gorlaeus represents the conspicuous case of a natural philosopher who remained committed to a geocentric cosmology while at the same time combating the Aristotelian distinction between a superlunar
and sublunary physics. Since he does not discuss the issue of the ordering of the planets, we have no basis for determining whether he inclined towards a Tychonic model (in which the Sun orbits around the Earth, but the other planets circle around the Sun). However, his embedding of a geocentric cosmology within a universal aerial fluid is compatible with Tycho, and may be explained by reference to Metius’ teaching at the university of Franeker.

If we take a step back from the niceties of his cosmology, and look at his physical system in its entirety, the following picture emerges. His combination of an atomistic ontology with an Aristotelico-Galenic notion of the temperament of mixts, Cardano’s two-element theory, Scaliger’s minimist theory of mixture and some occasional cosmological and chemical ideas yields a theory that is not in all respects coherent in defining the nature of either the atom or mixture. Furthermore, we have alluded earlier to the theological implications of his doctrine. We have seen that the physical atom is only a sub-class of all entia per se, of which God is the most important representative; by the same token, mixtures represent only one example in the category of entia per accidens, of which humans are the most important example.

In fact, Gorlaeus expends considerable energy on furnishing a proof that man is an ‘aggregate entity’ made up of body and soul, which, though co-existing within one another, nevertheless never loses its specific essences – a theory that was to trigger the Utrecht Crisis thirty years later. The theological reasons for which it might have been so important for Gorlaeus to separate soul and body will be discussed below in detail. Let us just anticipate here that in the eyes of Gijsbert Voetius, the anti-Arminian theologian who combated this thesis as late as 1641, it was linked to the heterodox views of the Arminians and to their understanding of the relation between man and God. The same holds true of Voetius’ son Paulus, who in 1657 still dedicated pages to a refutation of this thesis.

Theological concerns also explain certain aspects of the last part of Gorlaeus’ Exercitationes, where it is attempted to show that the principle that “nothing comes of nothing” (ex nihilo nihil) is invalid. The rejection of this principle may at first sight be surprising. After all, Greek atomism has often been depicted as an ingenious answer to the Parmenidean challenge to explain natural change without having to postulate the continuous generation ex nihilo of new bodies. For Gorlaeus, by contrast, atomism helps to prove the exact opposite, namely that God is not only everywhere present, but that he is continuously involved in the creation of entities and substances:

Each substance that is made, is produced directly by God, and whatever comes about is made by God, and is created out of no substance. […] Therefore, whatever substance is made, is made by God, and what perishes, is reduced by God into nothingness: by the same token, whatever is made is made out of nothing.
The aversion to the *ex nihilo nihil* and *in nihilum nihil* axioms was taken from the writings of the German philosopher Nicolaus Taurellus, as we shall document below. Why it was necessary for Gorlaeus’ own system is, however, not entirely evident, nor how it is compatible with the entire doctrine concerning mixture (which, after all, does not come about *ex nihilo*). However, one of the principal objectives of this reasoning is evident enough. It is to argue that the human body is an aggregate of atoms incapable of producing a higher form. God therefore does not only create the human soul *ex nihilo* on the day of conception, but also the *anima vegetativa* of all living beings, including plants, and the *anima sentiens* of all animals, including man. For Gorlaeus, this view entails that spiritual and material *entia* are ontologically independent of each other and mingle only accidentally. Given how strongly the Platonized hylemorphism of Latin Christian Aristotelianism had blended the material and the spiritual realms, Gorlaeus’ intellectual choice in favor of atomism must also be viewed in the light of the possibilities it offered to the theologian of separating the soul from the body – a view that had appeared as promising to Taurellus before him as it did to a range of Cartesians after him.

Both treatises by Gorlaeus conclude on a discussion of the soul. The shorter treatise ends with a defense of free will (*liberum arbitrium*) of both man and God. The *Exercitationes* ends, by contrast, in a different and fairly anomalous manner. One is indeed forced to conclude that Gorlaeus passed away before he had been able to finish the concluding part of his treatise, as he numbered the existing section as ‘1’ although there are none that follow it. Moreover, this last *exercitatio* differs markedly in tone and style from everything that precedes it. Here, Gorlaeus is found to paraphrase “answers” (*responsiones*) he had “once given to passages in the Holy Writings”; that is, a theological disputation, regarding the “famous controversy whether the souls were produced by God or by the parents.” As a matter of fact, the authorities he quotes in this concluding section are not philosophical but exclusively scriptural, and the manner of exposition is the disputational one of addressing arguments *pro et contra*.

This disputational question on the origin of the intellective soul addresses a notorious issue that divided creationism from traducianism. The issue of whether the individual soul was created *ex nihilo* by God or was instead generated by being handed down by the parents *ex traduce* divided philosophers at the time, and often along markedly confessional lines. According to Joseph Freedman, Lutherans tended to stress “that souls are generated, while their Calvinist and Roman Catholic counterparts asserted that God creates souls out of nothing.” This picture, while generally valid, is however too tidy. With respect to the case in hand, it will be shown that the opposing camps in the Calvinist controversy over predestination, the ineluctability of sinfulness, grace or damnation, could not have viewed the question concerning the origin of the soul and the possible contribution of the parents in a consensual manner.
Even in Gorlaeus’ unfinished discussion of this issue, one is tempted to discern a distinctly Arminian penchant. He rejects the arguments of both camps, which according to him rely on sterile and apodictic Aristotelian demonstrations that he compares to “pleasing pigs with mud.”

Gorlaeus’ own position lies somewhere in the middle: “The soul is generated by the parents out of nothing (ex nihilo), thanks to a singular act of God’s concourse, in which he decorates the soul with a variety of gifts and determines the parents’ general potency of generation towards this particular individual.”

This concourse, he adds, takes place in the moment of conception, and not only in the case of humans, but also of animals. With this position, he seems to insert himself in a tradition that goes back to Gasparo Contarini (1483-1542) and was handed down through Goclenius and Zanchi to Casmann, and which posited that the parents provided the indeterminate matter of the child-to-be, and God the form.

While the issue of the origin of the soul belonged to the realm of a Christianized natural philosophy, Gorlaeus’ theological embedding and thrust is evident not just from his discussion of scriptural passages, but from the question he addresses in the last seven pages of his treatise: it is the “urgent” question of original sin. This problem is urgent because, on the one hand, sin “cannot be just in the body, as it is a blindness in the intellect and a perversity in the will, of which only the soul, not the body, is capable.” On the other hand, it is also evident that God is the author of the soul. The question therefore evidently arises as to whether “God is the author of sin.”

Gorlaeus somewhat exuberantly claims that he knows how to resolve this age-old, ominous problem. His solution is both unconvincing and wild. In his attempt to drive a wedge between the Good God and the soul of fallen man, he proposes a doctrine that might anachronistically be labeled biological determinism. The evil innate in the human body and handed down from one generation to the next, he argues, is due to the individual ordering and disposition of the organs. Is it not known that people with a hot temper are, as it were, organically more disposed towards wrong-doing than others? “Many of the actions of the soul depend on this temperament. For they cannot be good, as they do their evil because of an organ.”

The solution to the tricky problem of God’s involvement in our wickedness is thus two-pronged: God bestows on the newly created soul all the original perfections that Adam had possessed before he had bitten into the apple, plus the possibility to deviate from them (what the scholastics, and Gorlaeus with them, call privatio). The parents, in turn, bestow on their child some positive organic “proclivity towards evil.”

Having settled this theological issue to his own satisfaction, Gorlaeus wishes to add something more general about the origin and disappearance of souls. After a detailed, almost phenomenological description of the act of sexual copulation, in
which he argues there is no precise moment in which one might possibly claim that the soul was created, he turns to the issue of spontaneous generation, which he takes to provide yet another proof of the intervention of God. The worms in the cheese were not in the milk, nor in the cow that made it, but were planted there by divine intervention. Whether the vegetative soul also requires God’s intervention is, by contrast, less obvious: branches, when cut off from the tree and planted elsewhere, are sometimes found to grow into new trees, as if the same soul were divisible. Do the three souls thus not behave analogously? Gorlaeus does not know, nor does he appear to have found the time to decide, as his own life’s time was up. His Exercitationes end abruptly, in great haste, and on a very odd note: “What must be said about the vegetative soul is not yet clear to me. But what must be stated about the origin of the sentient and rational souls, namely that they are created by God, has already been demonstrated. End.”

The soul is the only subject matter on which the two books differ markedly. The concluding book of the Exercitationes, “On the soul,” far from offering the natural philosophical analysis that one would have expected, seems to offer the mere paraphrase of a theological disputation whose focus lies on God’s involvement in creating and defining the soul, and on the question of God’s responsibility in handing down original sin. It is moreover characterized by a sinister emphasis on the “evil dispositions” that hamper the efforts of our will. By contrast, the concluding section “On the human soul” in Gorlaeus’ Idea physicae not only provides a more worked-out theory of the soul, but concludes with a eulogy of free will. Gorlaeus defines there the human soul as an immortal “spiritual substance,” which does not need to rely on a bodily organ. In an interesting argument, which in some sense anticipates a Cartesian idea, Gorlaeus adds that the soul takes most, but not all, of its truths from the senses; a number of “principles” are in fact innate, for example, that there is a God, or that there is a difference between ‘one’ and ‘two’. Turning to the issue of universals – a topic, we recall, that took up dozens of pages in the Exercitationes – Gorlaeus insists that the human intellect obtains universal notions by abstracting from singular ones (but evidently not the just-named innate ‘principles’). After having discussed the intellect’s modes of reasoning, he ends his treatise with the theologically sensitive issue of free will. Freedom, according to his definition, is the decision to “follow up or avoid the things that are understood in the intellect (res intellectas), by willing and choosing.” In contrast to the appetites of the senses, which desire only pleasure, free will relies on the intellect’s prior assessment of whether an action is good, honest, pleasant and useful. The action of the will is free – the contrary, an enforced will, would clearly not be a ‘will’ – and its freedom consists in its indeterminacy, that is, its prior indeterminacy. “The freedom of my will does not reside in my ability to will the good and not to will the bad, but in my ability to will (or not to will) a
given object. [...] In this way God, who wills the good, wills it freely: for he cannot will the bad."

With this shorthand version of a theodicy, Gorlaeus ends his discussion of free will and with it his entire treatise. The *Idea physicae* carries thus none of the more sinister deterministic overtones of the *Exercitationes*. One is left wondering, in fact, whether the *Idea’s* much more upbeat insistence on the freedom of will in its choice for the good comes not closer to Gorlaeus’ real view of the matter, while the sinful determinism of the *Exercitationes* contains the traces of theological positions that had been dictated by the professor under whom he may have conducted the disputation to which the text refers.

### 2.5. A BRIEF APPRAISAL

Anyone who thinks of Gorlaeus as an early modern scientist will reach the conclusion that his philosophy is strangely suspended between a quantitative theory relying on extended but indivisible entities and a theory of qualities that appears to be incompatible with atomism. We have seen that according to his physics, most phenomena are caused by the ‘real accidents’ of warm and cold, which are not only continuously generated *ex nihilo* and annihilated *in nihilum*, but migrate freely from one entity to the other. Gorlaeus’ world is indeed a far cry from both the materialism of ancient atomism and the mechanical models that became fashionable after Descartes in later decades of the century. His material atoms represent but one set of beings among others, which are immaterial. His is neither a mechanistic cosmos nor one in which final causes are abolished. In all these respects, Gorlaeus’ model fails to conform to our notions of atomism ancient, early modern or modern.

Yet such a picture, while certainly not false, looks at Gorlaeus from the wrong perspective. Instead of pointing to impurities in his apparently half-hearted atomism, we should attempt to comprehend how he arrived at his particular type of atomism in the first place, why he needed it and how it resulted from his overall project, a project whose ontological nature we have been at pains to emphasize. Gorlaeus’ is a world the main component of which is constituted by the *ens per se*, a category of ‘unit of being’ that counts as its members God, angels, souls, material atoms and real accidents. All of these beings possess unchanging essences. The being (esse) of God also includes a capacity to act (posse), which explains why God can create new beings. Almost all change in nature is due to the reintroduction of such new beings: some of them, such as the three types of souls (vegetative, sentient and rational), are singly created at their moment of conception; others, such as atoms, are endowed with ‘forces’ that propel them in God-given directions;
others again, such as the ‘real accidents’, spread through matter by multiplying themselves within various corporeal carriers.

Sure enough, this type of atomism may require a lengthy exposition of the type that was given above; but let us not conclude, for that reason, that Gorlaeus’ physics is unnecessarily odd, awkward or bizarre. The sixteenth and seventeenth centuries’ renewed sympathies for atomism nowhere resulted in a pure renaissance of ancient atomism. However much one may have praised Democritus as history’s first physicist or have admired Lucretius’ verse, there is no single so-called ‘atomist’ philosopher who would not have subscribed to Giordano Bruno’s above-mentioned caveat: “atoms and void do not suffice.” To begin with, no early modern atomist excluded God. It must however be obvious that the introduction of an omnipotent deity into an originally materialist world-view cannot possibly have left the ancient model intact. One finds, in fact, that early modern atomistic physics abounds in world souls, enlivening ethereal impulses, divinely implanted seeds or forces, sympathies and antipathies, God-programmed and therefore innate tendencies, and – with a renewed intensity after the triumph of Isaac Newton’s physics – forces acting between bodies over indefinite distances. Viewed in this context, Gorlaeus’ combination of atomism with other entities must not in the least scandalize us.¹⁴⁵

This ontological messiness, as it were, also affects the motives behind the revival of atomism itself. It has been persuasively argued by Hans Kangro, Christoph Meinel and others that the empirical evidence that was adduced for the existence of atoms was for the most part illusory and rhetorical. Neither did seventeenth-century microscopes allow for their ocular inspection; nor was there a chemical proof for the existence of atoms.¹⁴⁶ William Newman has repeatedly insisted that reversible chemical processes and notably the ‘reduction to the original state’ (reductio ad pristinum statum) constituted a powerful proof of the atomic structure of matter.¹⁴⁷ His insistence is of course entirely justified. At the same time, it is also true that only few chemical reactions allow for this type of reversal. Moreover, the resulting quantitative type of atomism does not solve the problem of the appearance and disappearance of the emergent properties even in those chemical substances that are susceptible to such reversible operations. Why the mixing of non-toxic ingredients should yield a poison is not explained by a model in which inalterable and merely quantitatively or geometrically defined atoms intermingle into a contiguous, merely spatial vicinity. Moreover, a range of mutually incompatible atomistic models can explain the observed reversibility. In fact, an explanation à la Scaliger, Gorlaeus, Basson or Sennert, which proposes material units that are primarily defined in qualitative terms and whose properties allow for a modification in such a way that a certain ‘union’ comes about when they mix, is probably better suited to the purpose than the purely geometrical descriptions of

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atoms offered by those who attempted to emulate Descartes’ mechanical model.\textsuperscript{148}

But if it is true that empirical findings did not really necessitate an atomistic conception of nature, what else did? What were the motivations propelling the early modern champions of discrete material units? As a matter of fact, a plethora of alchemical, medical, natural-philosophical, ethical, historiographical and literary impulses can be discerned behind the reinvigorated interest in atoms.\textsuperscript{149} Several of these exerted a direct or indirect influence on Gorlaeus, as we have adumbrated above and shall see in greater detail below. One additional motive must be mentioned here, which is usually ignored or contested, but which is quite forcefully present in the case of our young Dutch philosopher: theology.

It is usually held that theologians abhorred atomism. Sure enough, most Catholic and Protestant divines tended to view atomism as an outgrowth of Epicurean materialism and hedonism, decried it as a philosophy ‘devised in brothels’, and viewed its negation of substantial forms as a danger to the explanation of the Eucharist or the eternity of the soul. Yet, some philosophers came to prefer atomism precisely because of its theological potential: it allowed one to keep body and soul much more clearly apart than Aristotle’s hylemorphic model, in which “the soul is the first grade of actuality of a natural body having life potentially in it.”\textsuperscript{150} Others liked atomism because it allowed one to abolish secondary causes and give major responsibility to the first cause, God, whose omnipotence seemed otherwise unduly diminished. Sébastien Basson, a Catholic and Jesuit-trained philosopher and physician who had converted to the Calvinist school of Protestantism, admiringly recalled that the Islamic school of atomism – the ninth and tenth-century Basrian Mutâzilî, who constituted the first large school of \textit{kala\texttt{m} – had delegated all power to God, who was responsible for recreating the world in each atom of time anew.\textsuperscript{151} Basson had heard of this school through a commentary on Aristotle’s \textit{Physics} by the Jesuit Franciscus Toletus, who in turn based himself on Maimonides and Averroes. Toletus states:

For it was the view of certain Arabs [...] who said that these inferior causes were ineffective, and that God alone produced the effect when they were present: hence God alone burns when fire is present and operates whenever any other agent is present. The particular causes themselves behave only as the signs of divine action. Among the theologians, Gabriel [Biel] accepted this [on the basis that] those things happen in vain through many causes that can happen through fewer; but God can carry out all things by himself alone. Hence the cooperation of particular causes is assumed in vain.\textsuperscript{152}

Basson, who shared Gorlaeus’ passion for this sort of radical usage of Ockham’s razor, commented on this passage as follows: “These philosophers wanted, I say,
the same as Plato, namely that God, being the sole principal cause, uses the others as instruments.” In his analysis of Basson, Lauge Olaf Nielsen has pointed out that wherever the desire can be discerned to attribute all activity to God, and to suppress secondary causality as much as possible, seventeenth-century atomism displayed generally Protestant or often specifically Calvinist overtones.

Is this, then, also the ideological context through which we must explain Gorlaeus’ metaphysical atomism? Or what else propelled this young philosophy graduate and first-year theology student to espouse atomist doctrines? In order to answer these questions, we must reconstruct his intellectual biography – which is precisely the task of our next chapter. We shall find, first of all, a series of natural philosophical and metaphysical ideas that Gorlaeus acquired during his studies at his first university, Franeker, and from his philosophy professor and landlord Henricus de Veno. It must have been there that he thought of writing his natural philosophical work, the *Idea physicae*. At the university of Franeker first and subsequently at the university of Leiden, where Gorlaeus enrolled in 1611 as a theology student, we shall moreover encounter an agitated religious environment in theological turmoil. These circumstances, we may surmise, led him to embed his physics in a new metaphysics, the result being the *Exercitationes*. Drawing our sums, we will be able to conclude that while a number of important textual sources contributed to his very precocious and often daring theories, the time and place of the composition of his two books, namely Franeker and Leiden in the years 1610-1612, suggests that the overruling motivation for developing his philosophy in the directions in which he did were theological.