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Iconography between the History of Art and the History of Science: Art, Science, and the Case of the Urban Bee

At the tensest moment of the conclave that would elect the 56-year-old Maffeo Barberini to the papacy as Urban VIII in August 1623, a prophetic event occurred.¹ A swarm of bees entered the Vatican palace from the meadows facing Tuscany, and settled on the wall of Maffeo's cell. It seemed that Divine Providence had sent this portent to announce the imminent accession to the papacy of a member of that Tuscan family whose coat of arms had long since been transformed from one showing three wasps into an emblem of three bees.

Within a few years it was impossible to go anywhere in Rome without encountering the Barberini bees.

None of the beautiful fountains designed during the primacy of the Barberini by their favorite sculptor, Bernini, is without them. The walls of the ancient city itself, restored by Urban, carry this emblem of his papacy. From ceiling to floor, from the highest cornices to the pavements themselves, from triumphal entryways to modest sacristy doors, on tombs and every imaginable piece of church furniture one may still discover the threefold trigon or inverted triangle of bees that formed the main element in the family's coat of arms. All bear lasting witness to the patronage of the Barberini. Giant bees fly above Divine Providence in the center of the great allegorical ceiling that Pietro da Cortona painted for the Gran Salone of their newly rebuilt family palace on the Quirinal. Bees crawl up the twisted solomonic columns supporting the mighty bronze and gold baldacchino that Gianlorenzo Bernini fashioned, swiftly after Urban's elevation to the pontificate, to rise over the main altar of St. Peter's. Even on

the tomb Bernini later made for Urban in the apse of St. Peter's, minute bees climb toward the lid of the sarcophagus, not so much to smell the stench of death announced by the hooded skeleton who inscribes the name of the deceased pope on the black page of death, but rather to rise toward the sweet odor of sanctity, the famous *odor sanctitatis*, that issues from the tomb of the Barberini pope.

But there are two larger bees on Urban's tomb as well, which give the impression of having flown free of the sarcophagus in order to settle—but only briefly, it seems—above the grim reminder of mortality. Since they appear to be on an upward course, they must surely be the ancient symbol of the immortality of the soul; for in antiquity the bees that emerged from the bodies of dead animals stood for the spirit's ability to rise to heaven from the bodies of the dead.

But it was not only by means of great works in bronze and stone that the immortality of the Barberini would be ensured. Countless poems were written in praise of the Barberini, and hardly a book printed in Barberini Rome failed to carry the symbol of the papal family. Few medical, technical, scientific, or geographical works published between 1623 and 1644 lacked that distinctive symbol of sweetness, industry, and power.² When Galileo's *Assayer* was published just two and a half months after Urban's accession, for example, the papal bees appeared at the top of the title page, as if to encourage the support of the same Maffeo Barberini with whom Galileo had discoursed in friendship in Florence many years earlier. That friendship would become more than strained, but in this early honeyed phase the bees' presence signaled only mellifluous sounds.

The great Flemish painter Rubens, now known throughout Europe, designed a title page for an edition of Maffeo's own beautiful Latin poems. He powerfully illustrated the scene from Judges 14 in which Samson tears open the jaws of the lion to bring forth the sweetness of honey. Bees pour out of the lion's mouth, but in a lightened space just behind the vivid scene, a trio arrange themselves in the formation of the Barberini trigon. "Out of the strong came forth sweetness" is the central paradox of the riddle posed by Samson after his defeat of the young lion; and so the allusion is not just to the antique notion of the immortality of the soul, or to the honeyed beauty of Urban's youthful poetry. It evokes the benevolence and magnanimity of the Latin-loving poet who had attained the rank of supreme pontiff.

But bees, when irritated, also sting; and under the pressures of doctrine, politics, and a cosmos that was itself being transformed, the liberal benignity of Maffeo Barberini changed to sternness, and then into something chilling and unyielding. Before the end of the first decade of Urban's pontificate, Galileo was sent to the Inquisition by the man who had once been his friend. In 1612, in a series of discussions in Florence, Maffeo had supported Galileo with arguments in favor of his anti-Aristotelian views of the suspension of floating bodies in water. In the following year, when Galileo published his letters on the sunspots—thus calling into question the immutability of the

heavens—the young cardinal wrote to him not just that he accepted them, but that he would return to them over and over again with much pleasure.³ When Cardinal Belarmine issued his injunction to Galileo in 1616 to renounce his view that the sun was the center of the universe and that the earth revolved round it, Maffeo was instrumental in preventing Galileo from actually being condemned for heresy. Even in 1624 Galileo had several warm meetings with the newly elected pope in the vain hope of having the 1616 injunction lifted. But within a few years Urban realized that he could no longer protect the man whose theories were threatening to divide Christendom and overturn the world upon which the Church was built. The hasty and slightly surreptitious publication of Galileo's vigorous and unsparingly critical masterpiece, *The Dialogue on the Two Great World Systems* in Florence in 1632—in its final form it had not been authorized by the Vatican censor—was the last straw; and by June of the following year the Inquisition had threatened Galileo with torture, forced him to recant his views, and sent him into house arrest at his villa outside Florence.

The reasons for Galileo's progressive estrangement from the Barberini family, and from Urban in particular, and of their sudden abandonment of him have been much discussed; but there is one crucial set of documents in this complex personal and scientific drama that have not even begun to receive the attention they deserve. They take the form of panegyrics on the family of bees.

MICROSCOPES AND THE MELISSOGRAPHIA

The Jubilee year 1625 was the perfect moment for the newly elected pope to celebrate the power of the papacy, the triumph of the Catholic Church over the German heresies, and the glory and prosperity of Rome under the Barberini. The poets prepared epigrams, odes, and panegyrics in their honor. Even the mathematicians and scientists made it clear that none of their discoveries could have taken place under any other auspices than those that all of literary and scientific Rome were now united in acclaiming.

Much could be expected from the Roman *Accademia dei Lincei* (Academy of the Lynxes), that eminent association of scientifically minded humanists founded in 1603 by the eighteen-year-old Prince of Acquastarta, Federigo Cesi. Indeed, Galileo was himself a proud member of the Lincei, and desires to honor the new pope would have been extraordinarily compelling for many reasons. But toward the end of Jubilee year, the Lynxes seemed to be running out of time. They had been working on an elaborate celebration of the chief of all the Barberini emblems, the bee. But this celebration was not just antiquarian, philological, and archaeological. It was to be profoundly natural-historical as well. Just as the year was turning, they finally published three separate works, in which archaeology, philology, panegyric, and scientific investigation were combined in a wholly unprecedented way. Appearing in swift and almost breathtaking succession, they bore the titles *Melissographia*, *Apes Dianiae*, and *Apiarium* (Figures 1, 2, and 3).



Figure 1. Academy of the Lynxes, *Melissographia*, 1625, engraving by Mathias Greuter dedicated to Urban VIII.



Figure 2. From Justus Riquius, *Apes Dianiae in monumentis veterum noviter observatae*, Rome: Giacomo Mascardi, 1625, engraved frontispiece.

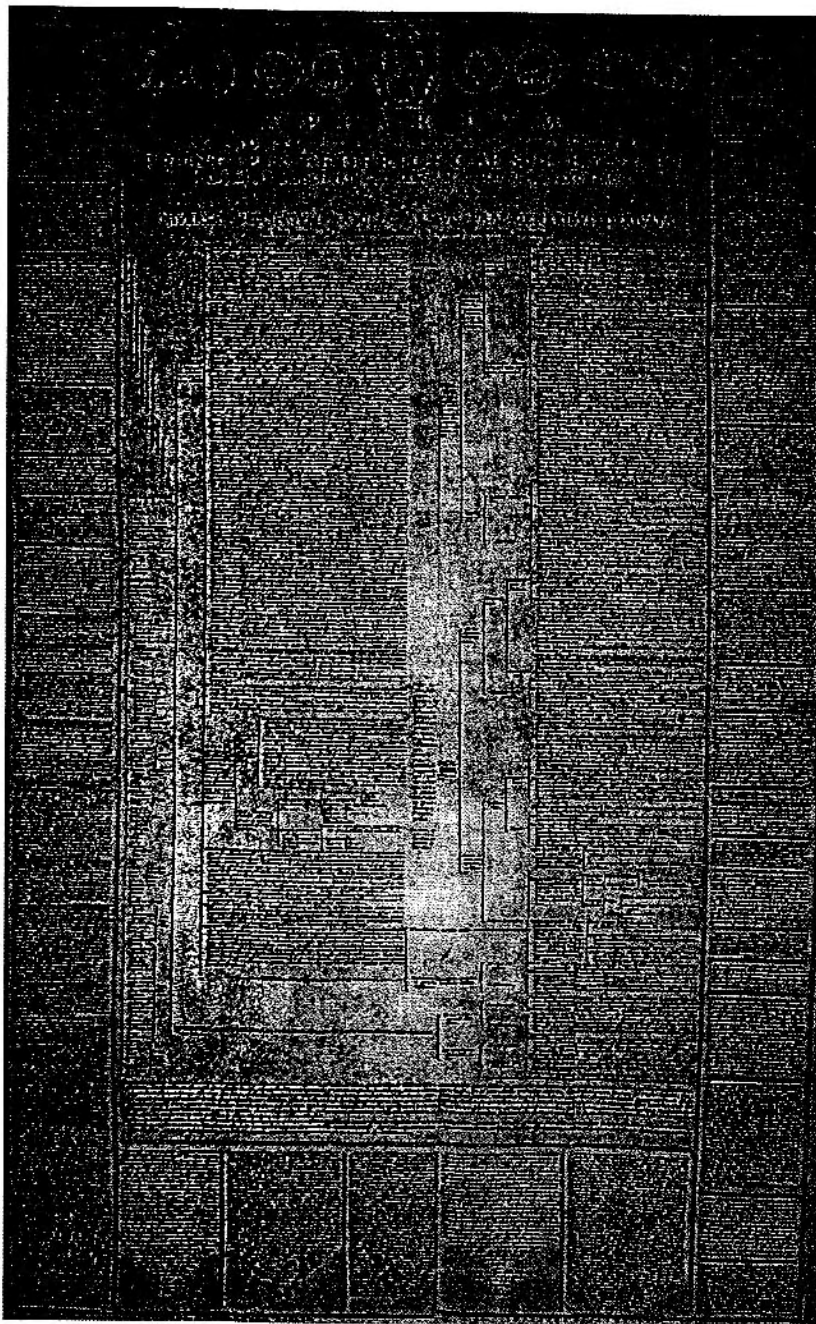


Figure 3. *Federigo Cesi and the Academy of the Lynxes, Apiarium, 1625, printed and engraved broadsheet printed on four separate leaves, total dimensions 107 cm x 69.5 cm. Published by the Lynxes in celebration of Urban VIII, just as the Jubilee year concluded.*

The first of these three works was an unusually large engraving on a single sheet, measuring 41.6 cm by 30.7 cm. Dedicated to Urban VIII, it carried its title, *Melisso-graphia*, in large Greek capitals, and it was the first printed illustration of a microscopically observed organic being (Figure 1). Signed in the lower right-hand corner by Mathias Greuter, it carries the date of 1625. Cesi was probably referring to this work when he wrote to Galileo on September 26: "The sheet included herewith has been made all the more to show our devotion to our Patrons, and to exercise our particular commitment to the observation of nature."⁴ How could the Supreme Pontiff fail to have been impressed? There, in the center, is the family emblem, the trigon of bees, framed by a flourishing pair of bay branches. Above, two putti hold aloft the papal tiara and the keys of St. Peter. But this is no ordinary trigon. These are not bees whose spiky forms have been reduced and mollified by the usual strategies of art. On the contrary. These bees seem to have been *examined* as closely as possible, their forms magnified many times larger than life, each one represented with extraordinary attention to anatomical detail. The precision of these details is remarkable and unprecedented. It is not just that one can easily make out the structure of the head, the tongues, the thorax, the abdomen, the all-important legs, the antennae, and the sting; it is also the astonishing success the engraver had in conveying the texture of the surfaces of the body of the bee, and the diaphanous and flimsy quality of its parts, especially its wings and the delicate extremities of its legs.

"Observed by Francesco Stelluti, Lyncean of Fabriano, by means of a microscope" is the proud inscription that runs across the bottom of the page. This is no simple illustration; it is an examination, a close observation from the life. Whereas other representations of the trigon simply repeated the same view of the bee disposed at the appropriate angles, Stelluti did something quite different. In order to examine the bee, Stelluti viewed it from above, from below, and from the side. And he had his fine engraver present his illustration in just this way. The idea could not more clearly have been to show the bee just as it appeared in life—or rather, as it appeared under the microscope. And then, as if yielding to more purely aesthetic considerations, a number of other details, other parts of the bee, are prettily displayed across the scroll that so elegantly unfolds with its texts across the bottom of the page: on the left, the head with its eyes, tongues, and antennae seen in profile, a frontal view of the head, and the beak; on the right, an antenna, a single eye, cluster of tongues and their casing, and the sting; and finally, in emulation of some graceful printer's vignette terminating a chapter, a pair of hairy posterior legs extending neatly across much of the width of the sheet.

"To Urban VIII, Supreme Pontiff, When this more accurate description of a bee was offered to him by the Academy of Lynxes as a symbol of their perpetual devotion." Thus the inscription at the top of the sheet. On the scroll below, with its illustrations of the parts of the bee, runs a much longer text, at once more complex and more significant.

O great Parent of Things, to whom Nature willingly submits itself, behold the BEE in the BARBERINI escutcheon. Nature has nothing more remarkable than this. Surveying it with a keener gaze, the work of the Lynxes has set it forth in these pictures, and explained it. The genius of the Cesi family has stimulated this sacred labour; the art of Pallas has aided these willing men. Great miracles have emerged as a result of their work with the polished glass, and the eye has learned to have greater faith. Had it not been for the divine discoveries of the new art, who would have known that there are five tongues on the Hyblean body [i.e., the bee's], that the neck is similar to a lion's mane, that the eyes are hirsute, and that there are two sheaths on each lip? Thus it is fitting that while the world looks up to you in wonder, your BEE shows itself even more worthy of wonder.

The sheet may have been intended as a panegyric to Urban VIII—and he could not have failed to be impressed by how much they had seen of the little animal that symbolized his papacy—but it can also be said that Stelluti and his fellow Lynxes could not contain their enthusiasm. They could not help themselves; they were so pleased with the results they had obtained with their new instrument that their panegyrist got carried away by the details of their discoveries. Their pride and their desire to promulgate the results of their achievement were themselves impetus enough for the panegyric mode. Even though fewer than half a dozen prints survive—suggesting that it was distributed to the pope and his family alone—here was the most visible and public statement they had made so far of their commitment to empirical investigation and experiment, and their belief in the power of sight to penetrate the mysteries of nature. In an age when science was torn between the old commitment to the scanning of pure surface and the new drive to theory, hypothesis, and abstraction, this was a crucial step. With the aid of the technology made possible by the perfecting of the telescope, one could begin to reclaim the old hope of arriving at the innermost structures of things.⁵

The eulogistic text of the *Melissographia*, in eight distichs and in more or less immaculate classical form, ostensibly composed in honor of Urban, was written by Justus Riquius (1587–1627). Known as Josse de Rycke in his native tongue,⁶ he regularly signed himself as “the Belgian Lynx.” His official role in the academy was that of panegyrist, because of his command of ancient rhetoric (which won him the appointment of Professor of Rhetoric at the University of Bologna, the very year he was working on the *Melissographia*). No one could have been in a better position to work on the second of the Lynxes' apiarian offerings of the autumn of 1625, the *Apes Dianiae*.

DIANA'S BEES AND THE ENIGMA OF CHASTITY

The *Apes Dianiae in monumentis veterum noviter observatae*, or *The Bees of Diana recently observed on ancient monuments* is a ninety-line elegiac poem, as Riquius himself

described it, in honor of Urban VIII; dated November 1625, it must have been printed hard on the heels of the Lynxes' first astonishing sheet. But the two works could hardly be more different. Where the *Melissographia* points to the future, the *Apes Dianiae* (Figure 2) remains locked in the past. It is an elegiac reflection, replete with recondite scholarly notes, discussing the representation of bees in ancient coinage.

Note D records three coins, illustrated on the frontispiece, in the collections of Urban's brother Antonio. It concludes with the claim that "as far as I know, no one has yet commented on the bees placed under the tutelage of Diana." Indeed, one of the major emphases in the poem and in the notes is the association of bees with Diana and with her coins. What exactly is all this about? The fact that Diana was the goddess of the threefold intersection known as the trivium—"Diana in Trivio"—only enhances the connection with the Barberini trigon. But there is much more to the connection than that, and this is what Riquius tries to spell out in his poem.

As everyone then knew, Diana was the stern goddess of chastity, who could strike down Actaeon because he saw her nymphs naked, or turn her favorite Callisto into a bear for having allowed herself to be seduced, albeit unwittingly, by Jupiter. As goddess of the hunt, it was natural enough that on coins she should often be accompanied by a stag. According to Riquius, even the famous many-breasted statue of Diana at Ephesus could not be thought of as in any way unchaste. Her abundant breasts, he asserted, were not for any sexual purpose, but rather for nurture and nourishment.⁷ And despite the *horned* stag that so often accompanied her representation on coins, she was also shown with bees, the very model of chastity. As the ancients knew, bees were supposed to be autogenetic; they reproduced without any kind of sexual congress⁸ and were therefore particularly pleasing to Diana.⁹

The known chastity of Diana and of bees provides the link to the Lynxes' objectives in the *Apes Dianiae*. As Riquius repeatedly observed throughout his poem, the bees of Diana were precisely suitable as a metaphor; the world, Riquius sang in his introductory "Epigram" to the saintly pope, was all the purer because of the chaste and virginal model of the Supreme Pontiff himself: "*Incorrupta tuos servabunt saecula mores / Virgineo castus Praeside Mundus erit.*"¹⁰ The leitmotif of the poem lies in this parallel between the chastity of bees and that of Urban himself.

But there is more than mere chastity at work. When Riquius writes in his elegy that bees are dear to Diana because of their chastity, because they do not engage in sexual congress and are in fact autogenetic—*ex sese genita*—he adds a note to the following effect:

As Pliny noted, the way in which bees are generated is a great and subtle dispute amongst scholars. But it is certainly agreed that they produce a foetus without coitus and that they lack either sex. Therefore, since they are virgins, they are consecrated to the Virgin Diana.

And there he leaves it.

But if there was a single most pressing natural historical problem—let us not yet call it biological¹¹—that occupied Cesi and his colleagues at the time, it was precisely the problem of generation and reproduction. They were concerned both with the general issue and with particularly difficult and enigmatic cases. Bees were a special crux, for exactly the reason that Riquius spelled out in his note.

In these two documents from the last months of 1625, therefore, pure classical panegyric, in the most learned and traditional form, confronted fundamental and urgent scientific issues—and this on the heels of adopting a wholly new technique for the examination of what we can now surely call biological phenomena. That is, both technological apparatus and scientific curiosity paved the way for determining the bees' reproductive structures and systems, but the inquiry was bound within the elegant constraints of the panegyric mode. Nothing exemplifies this conundrum more strikingly than the way in which this panegyric is used to allude specifically to the problem of the reproductive system of bees. But was there any way in which the strategies of panegyric and of scientific investigation could still come together, or were the two forms already inevitably divided, as they were destined to be in the modern era that was even now in the process of being forged? The answer is complex.

THE STINGLESS KING

The third and final document published by the Lynxes in celebration of Urban VIII as the Jubilee year ended was the most important of all, the huge broadsheet titled the *Apiarium*, or *Apiary*, which Cesi had begun to prepare almost immediately after Urban's accession (Figure 3). As a panegyric, it is one of the most extraordinary examples ever written of that ancient and sycophantic genre. But deeply buried within it, and hidden by a surface that glitters with an immense range of classical learning, is a plea for tolerance, benignity, and restraint, and a foreshadowing of the implications of Galileo's discoveries for the sciences of life.

Cesi's *Apiary* was the most thoroughgoing and most imaginative printed examination of the archaeology, history, literature, and science of bees yet undertaken—but it was also rooted in the concrete reality and minuteness of nature itself. In his letter of September 26, 1625, Cesi announced its forthcoming publication to Galileo. It was intended, he wrote, not only as an expression of the Lynxes' devotion to their patrons, the Barberini, but also as an example of their particular commitment to the observation of nature, *il nostro particolar studio delle naturali osservazioni*.¹²

The *Apiarium* is testimony to an age when the borderlines between science and art, rhetoric and analysis, archaeology and theory, scientific experiment and poetry, were far more fluid than they are now. Printed on four separate sheets joined together, it measures 107 cm × 69.5 cm, very much larger than most other broadsheets published

until then. At the top of the sheet is the papal stemma with its trigon of bees, flanked on each side by the obverse and reverse of two ancient coins with bees on them. The first of the coins on the right of the stemma is the Megarensian coin already reproduced and discussed in Riquius's *Apes Dianiae*, while the second of the coins on the left (a bee and a pasturing stag) is a coin from Ephesus, which Riquius describes in his note E as belonging to Cesi himself. The other two coins are from Aptera (showing a profile of Diana and a bee with the inscription *APTA*) and from Metapontum (a bee alongside the two ears of wheat of the Metapontan mint on the obverse, and a bust of Leucippus with the inscription *HERAKLEION* on the reverse).

In the *Apiarium* itself, with its dauntingly dense paragraphs, its all but unreadable "emblems" that surround the central text, its digressive wordplays, and its sheer ambition to form only part of a vast "Theater of Natural History," we notice primarily the stress on papal panegyric, within which is wound an insistence on two things: the fact that the Urban bee does not sting, and that both bee and pope are chastity incarnate. But this chastity is linked inextricably with a manifest fecundity. Indeed, of all the topics within the huge corpus of information the *Apiarium* presents, it is the problem of generation and reproduction, the *GIGNENDI purissima ars* or "purest art of GENERATION," as one of the emblems calls it, that seems to receive the most obsessive attention. The manuscript begins with this issue, but it is framed within a discourse of "stinglessness" that is perhaps crucial to the wider understanding of its purpose.

The *Apiarium* opens with a flurry of classical citations. They serve not only to praise Urban but specifically to testify to the fact that despite his extraordinary power and beauty, the father, king, and supreme lord of bees does not sting. Throughout this great work, ironically enough, the panegyric turns on the parallel between the "king" bee and Urban VIII (these were before the days that it was known that the leader of the hive was in fact the queen).¹³ The central section begins with a reference to Columella, who like most recent writers says that the leader of the bees does not have a sting; but Aristotle and Ambrose say that he simply does not use his sting; Aelian and Pliny, on the other hand, disagree. And so on, down to modern classical scholars, such as Scaliger and Cardanus.

Why this emphasis on the sting—or rather, the lack of the sting—of the king bee? Because it was precisely the appeal to Urban's benignity and goodwill that motivated this panegyric. Certainly the desire to give evidence of the Lincean researches and the use of a new scientific technique was present here too. Everyone else who panegyricized Urban in that year hoped thereby to win something of his favor; but in the case of Cesi and his fellow Lynxes the need was especially urgent. After all, it was the core group of Lynxes who had encouraged and taken care of the publication of Galileo's *Assayer* of 1623. In it Galileo reemphasized his vigorous and persistent Copernicanism, despite repeated papal warnings not to do so. The work was printed and presented to Urban

only two months after his accession to the papacy. It was instantly in demand, and Urban, for all his broad-mindedness, must soon have begun to wonder about the wisdom of having his papacy associated with theories that so patently seemed to threaten the foundations of the Church itself.

"If you should irritate his sting, flee," begins one of the final emblems in the *Apiarium*. But he only stung the wicked and unjust; surely the Lynxes could not be held to occupy such a category. Certainly, they could not have needed Urban's support more desperately. They were in the course of preparing their *magnum opus* on American plants and animals, the so-called *Tesoro Messicano*, in which Galileo's discoveries would be praised openly and even more highly than hitherto. In this book the Lynxes anti-Aristotelianism would be made even plainer, and their own researches depended on the support and protection of both Urban and his nephew Francesco. The Lynxes had to ensure that the Barberini bees would not turn against them or Galileo. "The BENIGNITY OF BEES," the *Apiarium* anxiously proclaimed, "wards off both innate and acquired faults."

Rectitude was, of course, also manifested through chastity, on which the *Apiarium* also insists. The Father Pope, or the king bee, procreates and even inseminates without sexual desire. He is not even remotely libidinous, and actually beyond desire. You have to admire him: he knows none of the soft pleasures of sex, none of its mad irritations. He seems to shy away not only from bad odors and from those who are drunk, but particularly from those who have just engaged in sexual intercourse. This is the kind of information that Cesi could have had from ancient writers such as Varro and Columella. The king and father wholly eschews the impurities of lust. He is virginal—yet immensely fecund. But what is all this about, other than the need to panegyricize yet another quality of the pope? It arises from Cesi's central concern with the problem of the generation of bees, and the paradox already noted by Riquius: that whatever their differences about the way in which bees are generated, most authorities, both ancient and modern, agreed that bees—like the pope—produce their offspring without coitus. The question of asexual reproduction becomes, then, a question of two great reproductive "miracles" in the kingdom of animals and the kingdom of the Church. Just as science might illuminate questions of the heavens, it promised to cast light on the representative of heaven's rule on earth.¹⁴

Even without these pressing religious and political considerations, for Cesi the question of generation was one of the central mysteries of nature. The *Apiarium* exhorts: "Behold the admirable work of making offspring—the purest ART OF BEGETTING, the *gignendi ars purissima*, far beyond the gates of desire, the most singular and mysterious spectacle in all the Theatre of Nature." It was just this "spectacle" that Cesi set out to examine in the main section of the *Apiarium*. But these are also poignant words. Could it be that at least part of the intensity with which he pursued the subject had to do with the persistent loss of his own children during childbirth?

Presumably,¹⁵ yet from the very beginning Cesi believed that insight into the order of nature had to begin with the problem of generation and reproduction.

Cesi's immensely complex theory of the reproduction of bees involved his particular interest in the behavior of liquids and solutions at different temperatures (in this case honey, from which future bees were supposed to be generated), his view of the social organization of bees (the king gives rise to all his workers and subjects, who are protective of, and protected by, their king), and his need for order in the midst of a phenomenon so elusive that it seemed to be at odds with the very possibility of verbal representation: "*quod unicum, quod multijungum naturae opus, difficile verbis repraesentaveris*" (how difficult to represent in words this unique and multifarious work of nature!).

What is significant is the realization by Cesi and the other Lynxes that one has to penetrate deep into the anatomy of the bee in order to understand the organs of reproduction. To find the keys to a better classification of the many types of bees, one must go into their interiors, rather than base classification on their exteriors alone.¹⁶ And so, deep within the *Apiarium* are the preliminary results of the Lynxes' work with the microscope, not only by Stelluti but above all by Fabio Colonna. This desire actually to see and observe is enshrouded by the panegyric, but will not be denied by it. It appears most strikingly apparent on those occasions when Cesi expresses his frustration at what cannot be seen with the naked eye: the particles within the liquid honey, the seminal substance of the bees, and the actual place in which they are formed. (Here, in referring to the *gynaecium apum*, Cesi seems to show some sense of the possibility that female bees may play more of a role than the rest of his discussion may have suggested). For all this, however, only the brand-new instrument, the microscope, could serve; and even it would leave some of that desire unassuaged.

AN EPISTEMOLOGY OF MICROSCOPIC VISION

In April 1624, Galileo went to Rome to try and ingratiate himself with the pope. One of the very first things he did was to confer with Cardinal von Zollern about the use of the microscope—or rather about the two types of microscope that were then available in Rome.¹⁷ It is not entirely clear which of these types Johannes Faber was referring to when he wrote to Cesi on May 11 about Galileo's meeting with von Zollern; but he could barely contain his excitement:

I spent yesterday evening with our Signor Galileo, who is staying near the Madalena. He has given a very beautiful *occhialino* to Cardinal von Zollern for the Duke of Bavaria. I examined a fly which Galileo himself showed me; and I was astonished.¹⁸

By September of the same year Galileo was sending microscopes of his design to a number of people, including one to Cesi and his wife, Isabella. This generous gift was accompanied by a famous letter to Cesi of September 23, 1624, in which Galileo referred to his examination of the horrid flea, and the beautiful mosquito and moth:

I am sending your Excellency an *occhialino* to view the smallest things as if from nearby. I hope that you will derive no small pleasure and enjoyment from it, just as I did.

And after describing in some detail the correct way of using the new instrument, as well as his own fascinated observation of insects, Galileo concludes:

But your excellency will have a huge field in which to observe many thousands of specimens. I beg you to notify me of the most interesting things you observe. In sum it gives us the possibility of infinitely contemplating the grandeur of nature, how subtly she works, and with what ineffable diligence.¹⁹

Of all the senses, the eye was the chief instrument of observation, the microscope its preeminent aid. But what were the limits of vision, and how far could it be aided? This was the problem that continued to plague the Lincei. Even by 1625, when the microscope was clearly ready for use, and the Lincei were ready to tell the world—or at least a part of it—of its possibilities—they remained desperately aware of its limitations. Hence the frustrations expressed in the *Apiarium*, not only about what could not be seen, but also about the fundamental insufficiency of the microscope itself. This, as we shall see, had much less to do with technical matters, such as the quality or the placement of the lenses, than with the very principles upon which the use of the promising new instrument was based.

In the *Apiarium*, there is heroic microscopic detail (see Figure 4). The detail is heroic because of its magnificent intensity, but also because the author proceeds in the knowledge that it cannot be conveyed adequately in words. The clear implication is that one has always to go *beyond* the simple processes of seeing and describing. What *this* entails, however, is the impossibility of ever seeing, or describing accurately, enough. However much one might enlarge the object under examination, one has always to assume that there remains something that is there but is forever beyond the reach of the organs of sight. Sight is essential for good science, but sight alone can never be sufficient. This is already implicit on several occasions in Cesi's account of the generation of bees; but it is made explicit in the final passage on the microscope in the *Apiarium*:

If you can discern with it many subtly constructed things, you will conclude that there are still other much smaller things yet, which escape and elude even the

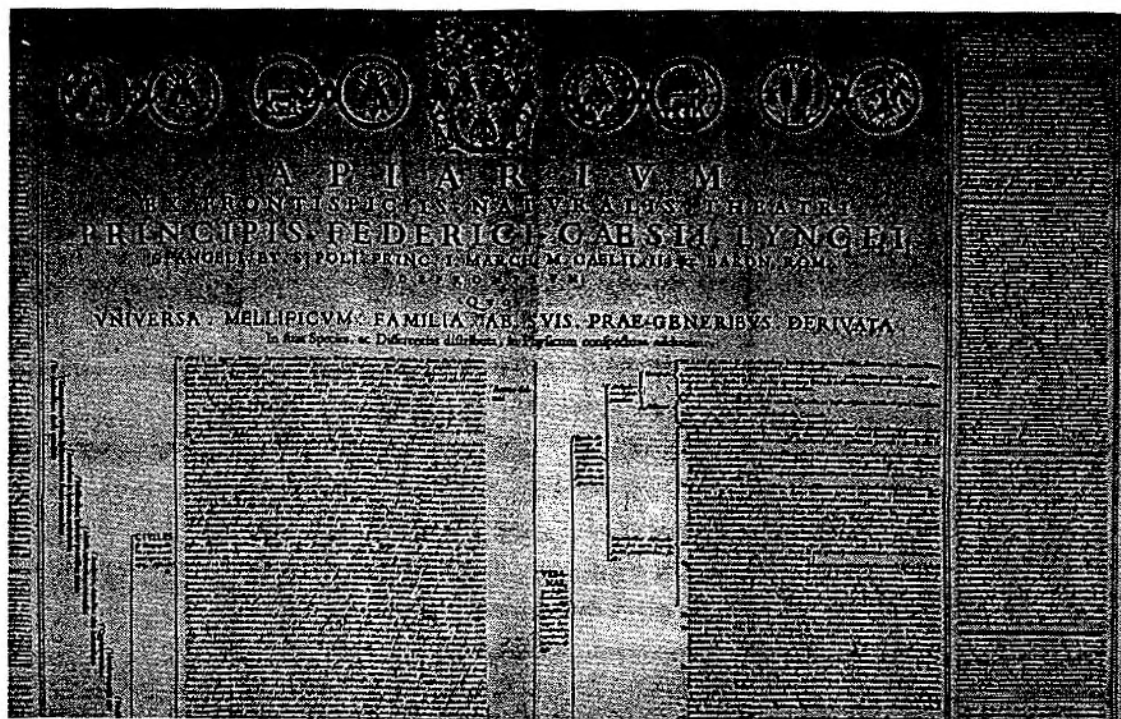


Figure 4. Detail of Federigo Cesi's *Apiarium*, 1625, printed and engraved broadsheet.

sharpest of instruments constructed by us. This also applies to our telescope: while it draws further things closer to our eyes, you can also judge that there remain other things even further away, which it could never reach. Therefore we accept the fact that there is no small number of very small and very distant things which cannot be seen.

Nothing could be clearer than this acknowledgment of the limitations of the microscope and the telescope. They are limitations beyond the limitations of sight itself, and beyond the impossibility of ever seeing everything that goes into the constitution of natural bodies. The mere use of the senses, therefore—however hard Cesi might have insisted on all of them—could never reveal the ultimate basis of things. This was the truly Galilean part of his science. The use of the microscope was only the beginning of the real work that still remained to be done.

When one considers these epistemological tensions within the *Apiarium*, one begins to sense a movement away from the raggedness of ordinary visual description toward a more unified picture. What is at stake, finally, is the ordered, mathematically determinable structure of all things—epitomized by the golden, reticulated apian eye revealed by the *occhialino*. Ironically enough, it was the microscope alone that could

corroborate such details, and the microscope that could confirm this fundamental perception of the world as mathematically structured. On the face of it the microscope might only have been expected to yield more in the way of descriptive density; yet it had begun to confirm the kinds of geometrical patterns underlying natural forms that Kepler discovered with the naked eye on the bridge in Prague and that Cesi had only recently begun to realize provided the basic clues not only to the secrets of the heavens but to those of earth as well.

PANEGYRIC “SCIENCE”

In so many respects Cesi’s account of the bee in *Apiarium* was simply wrong. His view of the crucial role of the king bee, and his insistence on the nonsexual aspects of reproduction, was quite obviously motivated by the convenient coincidence of his reading of classical texts on the bee (notably Pliny the Elder, but many others as well) with his desire to panegyrize the asexual but generative Barberini pope. The texts supporting these views must have seemed especially *ben trovati*. Bounded as well as buoyed by his motivations for such good finds, it was not for Cesi to discover, as Butler did in his *Feminin’ Monarchi’* of 1634, that the leader of the hive was in fact the queen bee. For Cesi in the Jubilee year of 1625, the king bee needed to remain a natural analogue for the necessarily chaste ruler of the Church.²⁰

But to insist that the *Apiarium* is not “scientific” for having such interests is to use the word naively and ahistorically, and in a way that is uncritically conventional. It is to assume that the modern terms of “science” (whatever they broadly may be) are the only terms by which Cesi’s project may be defined. But one does not have to be a committed Kuhnian or Feyerabendian to acknowledge not just that the terms of “science” in the seventeenth century were different from our own but that for Cesi and his fellows their procedures and their descriptions counted as science. The task, therefore, is to determine the extent to which such science differed from preceding approaches to natural history and the nascent sciences of life, or biology, as we now, *pace* Foucault, broadly call it. There *was* a change in seventeenth-century science, and its most exemplary and brilliant figure was indeed Galileo, but to ignore the work of his closest friends in fields other than those that he specifically made his own is to ignore some of the foundational changes in the edifice of what we like to think of—broadly, again—as modern science.

For Foucault, as for Alexandre Koyré, premodern science gave equal—or almost equal—status to mythological, historical, and even what we now call magical explanations as it did to observational ones. Direct observation was not especially valued, and played less of a role than explanations derived from the occult sciences, such as astrology and alchemy. Theory, such as it was, was predicated less on the roles of hypothesis

and proof by experiment than on the evidence of ancient and established authority. For Koyré sixteenth-century natural histories went “no further than the stage of a catalogue.” In this view, then, pre-Galilean science—and in particular, natural history—lacked “a classificatory theory, the possibility of classifying in a reasonable manner the facts collected.”²¹ For Foucault, the new *episteme* of the seventeenth century was predicated not on similarity but on difference, not on variety but on identity, on number, and on structure.

Flawed as such views of the distinction between pre- and post-Galilean science may be, they force upon us a reconsideration of the status of the scientific activities of Cesi and his Lincean colleagues. For their work cannot be considered wholly in terms of the old paradigms, or of the old *episteme*, as Foucault would put it. True, Cesi places great store in the old authorities, but he is hardly uncritical. New knowledge, new facts—in vast abundance—demanded from him a critical rethinking of the idea of authority itself, and made him realize “the possibility of classifying in a reasonable manner the facts [he] collected” from the very beginning. Furthermore, the evidence of the old writers as well as the conclusions drawn from the occult sciences could now be tested—*had* to be tested—by means of direct observation and by the possibilities offered by unheard of new techniques of observation. And these new empirical techniques in turn compelled and elicited a whole new theoretical style that focused on the inner operations of things not seen by the eyes. The Lynxes’ project was thus wholly divorced from the old theories—such as the many and varied physiognomic ones—that had postulated equivalences and correlations between outer appearance and inner mechanisms and functions.

The *Apiarium* provides critical testimony to these changes. True enough, there is much reliance on ancient sources. The abundant digressions rarely seem to rise above the level of the anecdotal. But not to give this work its due as science would be to omit those aspects that are indeed valuable from a purely empirical point of view (such as the very lengthy and detailed listing of American bees, based largely on firsthand sources) or to misrepresent the beginnings of approaches that would in fact bear lasting fruit. Throughout the *Apiarium*, one realizes the presence of a conscious need for an internally consistent hypothesis that may be in fact—*has been* in fact—ultimately to be proved or falsified by the eventual provision of empirical and experimental data. Still embedded in the antiquarian structure of the panegyrist’s theme, this empiricism lay deep in Cesi’s labyrinthine Latin text. This is not true in the case of the final Lynxian publication to be addressed in this essay, Francesco Stelluti’s magisterial *Persius* of 1630.

THE PERSIO OF STELLUTI

“Lyncean of Fabriano,” Stelluti had done the micrographic observations for the *Melissographia*; now he would complete a work, largely unencumbered by the necessity for

panegyric, that reunited the seemingly separate paths upon which the *Melissographia* and the *Apiarium* had embarked.

Stelluti's *Persio* was a work whose likes had never been seen before. For many years Stelluti had taken an interest in the literary possibilities of the vernacular Italian of his day, particularly Tuscan. He had written epithalamia on the marriages of Cesi and his brother, and where men like Riquius wrote dedicatory poems in Latin, Stelluti contributed splendidly direct vernacular poems in praise of Galileo to the preliminary pages of both the *Essay on the Sunspots* of 1613 and the *Assayer* of 1623. Barely had he finished collaborating with Cesi, Faber, Colonna, and Riquius on the *Melissographia* and the *Apiarium* when he turned to his next and most important project. This was the translation of that complex and difficult Latin poet, Persius, whose six elegies contain some of the most allusive and obscure lines ever written in all of Latin literature. It was precisely their robustness and colloquial quality—to say nothing of their insistent digressiveness—that Stelluti sought to emulate in his translation.

The work that finally appeared in 1630 (Figure 5) is an extraordinary performance, remarkable not only for its blunt use of the Tuscan dialect (deliberately reflecting Persius's own Etruscan heritage) and the vigorously free form of what was known as *verso sciolto*—blank verse—but also for its notes. These were not purely literary, or text-critical, or even archaeological, in the manner of someone like Riquius. The attempts at textual criticism were feeble and haphazard, and variant readings were only mentioned when they provided the opportunity for discourse on some other, more interesting subject. Stelluti's real subject in the notes were the items of natural historical and scientific interest, which he added whenever he could find an excuse. The most insignificant reference in the elegies sparked magnificent, if sometimes rambling, excursions on the work of the Lincei. Thus it came about that this vigorous literary exercise provides us with some of the most crucial information we have on their researches, in the very year in which Federigo Cesi's life and work were so abruptly cut short. The notes of the *Persio* offer eloquent and moving evidence of Stelluti's devotion to the man he admired more than any other, to Cesi's own unfinished projects, and to the kinds of work the Roman nobleman had inspired Stelluti himself to do—most notably with the Lynxes' technology of choice, the microscope.

As examples of the Lincean digressions that adorn Stelluti's *Persio*: Persius mentions a parrot; Stelluti refers to Faber's long examination of the various species of parrots in the *Tesoro Messicano*. Persius scoffs at the soft luxury of poets who scribble on couches made of the wood of the citron; Stelluti comments on the gleaming quality of that same wood when polished—and uses this as a pretext for a long and detailed description of the fossilized wood that Cesi found in the hills around Acquasparta, and which he called *metallophytes*, “of a middle nature between plants and minerals.” Persius jokes about poets who write as smoothly as if they were drawing a line with one eye shut; Stelluti adds a long discourse about the advantages of looking with one eye

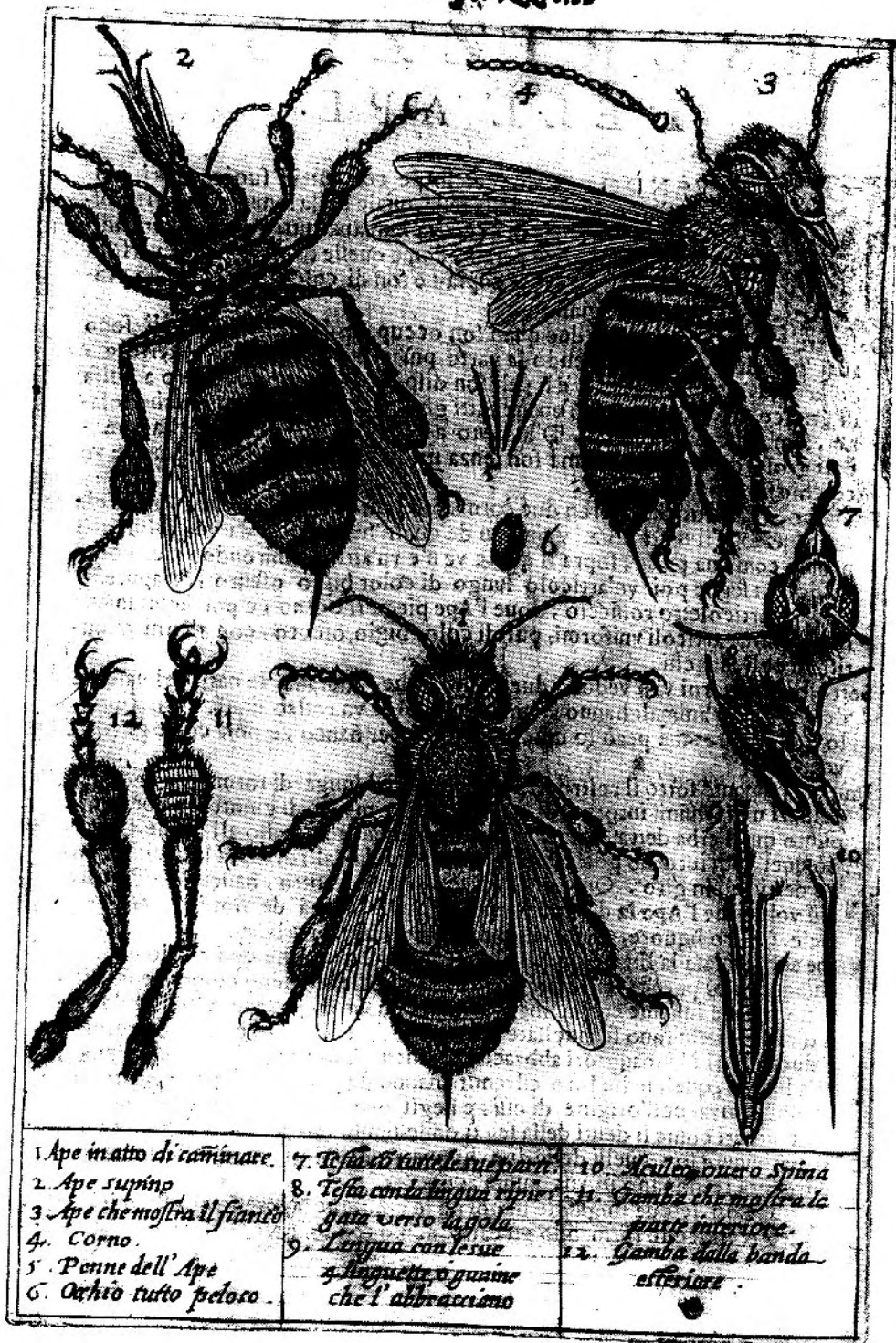


Figure 5. Engraving from Francesco Stelluti, *Persio tradotto in verso sciolto*, Rome: Giacomo Mascardi, 1630.

only in certain activities, itself a prelude to a detailed discussion of Della Porta's views on binocular and monocular vision in his *De Refractione*, which in turn is followed by a long passage praising Della Porta's work as a whole, insisting on his primacy over the Dutch in the invention of the telescope, and finally hailing the way in which Galileo, *nostro Accademico Linceo*, perfected it. There are hundreds of such digressions, all packed with classical and modern erudition. Desultory, aleatory, seemingly haphazard, they all weave a tapestry of praise to the Lincei and their endeavors.

But let us return to the bee. Stelluti had not yet finished with it; it forms the center of what is justly the most celebrated part of the book. He arrives at it in a typically roundabout way; his pretext for introducing it is the flimsiest. In line 129 of the first satire Persius makes a satirical reference to the town of Arezzo; this provokes what is perhaps the most important note of the book. Stelluti lists several of the many ancient writers who mention Arezzo; but then, observing that some critics have read not "Arreti" for "at Arezzo," but rather "Ereti" for "at Eretum," he points out that the ancient town of Eretum in the Sabine countryside was in fact the present-day Monterotondo, seat of the Barberini country estate. Thus, Stelluti has his pretext. The Barberini were endowed with the greatest of gifts and virtues, he begins. Under the patronage of their symbol, the bee, the arts and sciences had flourished as never before. Having dragged in the bee, it is fitting that the example he chooses is Cesi's *Apiarium*, "full of erudition and original and novel concepts, restricted to one large folio, it is true, but so full of data and theories that it could just as well form a large volume." Stelluti then recalls his own observation of the bee under the microscope, as published in the *Melissographia*. He had discovered things not known to Aristotle or any other ancient naturalist or philosopher, he reminds the reader, but now he has examined the bee with still greater diligence; the results of this examination, he says, he has placed at the end of the satire. He does not, after all, wish to interrupt his reader with too long a digression.

The full-page illustration of a bee and its parts (Figure 5) that appears at the end of the satire is perhaps the most unexpected image ever to appear in the edition or translation of a Latin poet. But when compared with the fine and grand engraving that is the *Melissographia*, the much smaller illustration in Stelluti's *Persius* comes as a disappointment. But if the actual contents of this presentation appear to offer no surprises, then the methodology of presentation is strikingly different from its most immediate precedent. In the suppression of the decorative bay leaves and putti surrounding the bees of the *Melissographia*, and the absence of its elegant cartouche and beautifully calligraphic typology, the *Persio* bee is—to put it simply—more factual. However artfully they may still seem to be arranged, the parts of the bee are disposed across the page in a much less contrived way. There is a simple frame. The elements of the illustration are numbered, correlated with an unadorned listing. And the listing itself is not embedded in a poem consisting of fine Latin distichs; instead, the parts are identified

in the plainest and most direct vernacular. The facts are presented for what they are, and not (or at least not exclusively) for their antiquarian or panegyric implications.

All this applies equally well to the long description that follows. It is in fact here, rather than in the illustration, that we see the full fruits of Stelluti's observations. There can be no question that it is the verbal description that marks the real breakthrough, not the illustration of the bee.

It is true that the account by Cesi of the actual microscopic examination of the bee in the *Apiarium* is written in a rather more direct way than the rest of that forbiddingly dense and convoluted work; but still it is embedded in the midst of panegyric and praise, written in a difficult Latin, with the struggle for dispassionate description painfully obvious and the lure of rhetorical devices ever present. Stelluti, on the other hand, separates his description from the rest of his divagations. He assigns it an appendix of its own. It is clearly detached from his rhetorical, digressive, and (muted, but still present) panegyric agendas; and it is written in a straightforward vernacular, clear and easy to understand.

In the *Persio*, one cannot fail to be struck by the plain directness of the language Stelluti uses. It would be impossible to exaggerate the difference between the complex and insistent density of the *Apiarium* and the lucidity of the description of the bee in Stelluti's *Persio*. Not a single ancient writer is mentioned. It is free of the rhetorical devices that so encumber the *Apiarium*, even in those parts of Cesi's text where panegyric loses its accustomed grip on the exposition. There are light years between the classical Latin of the *Apiarium* and the suppleness and clarity of Stelluti's vernacular.

This distinction, broad though it may be, is crucial. For the Lincei, the vernacular—and by no means the Italian vernaculars alone—played a fundamental role in the new forms and subjects of science. Unlike the older and often occult science the secrets of the new were increasingly intended to be plain and accessible, at least in principle. Just as one could now appeal, at least in the first instance, to the clear evidence of the eyes, rather than to the testimony of ancient books and writers, so too one could rely on the quotidian directness of the vernacular. The vernacular was robust and unfussy, flexible and witty, as Galileo himself showed time after time. It was capable of all the clarity the new science demanded. It could not cloak obscurity in lengthy Ciceronian or worse Latin. Colloquial and invitingly dialogic, it could not appeal to tradition and traditional authority in the way the older scholastic languages of science did. No wonder the major works of Galileo's maturity, the *Assayer* and the *Dialogue on the Two Chief World Systems*, were written in the same robust Italian as Stelluti's *Persio*.

For Galileo as for Cesi, Stelluti, and their Lincean colleagues, tradition and dogma stood in the way of the discovery of scientific truth (although their passionate immer-

sion in classical culture suggests that the ancients could be viewed as a gateway, not merely as a roadblock). Increasingly, Aristotle, Pliny, and the others could go; one had instead to rely on observation and hypothesis. Physics is separated from metaphysics; methodology takes its place. And it was no arcane methodology: even geometry could be learned and grasped without the study of Greek and Latin. Antiquity could no longer be held as the exclusive realm of knowledge; its fruits had to be adapted—and if necessary, rejected—by the pressure of new knowledge from every side.

Latin—and the other classical languages, Greek and Arabic—had been the languages of the Old World; but now the evidence of the New was emerging abundantly every day. The major project of the Lincei in the very years they were editing and supporting Galileo was their great work on the fauna and flora of Mexico. This work is astonishing in its insistence on the importance of vernacular names and vernacular knowledge. Plants and animals had been discovered whose equivalents could not conceivably be found in Aristotle or Dioscorides, and the Lincei knew that it would be vain to seek them there. The new natural history, like the new science, had burst beyond the bounds of the old books.

And just as evidence of the New World pressured old authority, so too did the evidence of the local—once old authority was shown to be incomplete, it became clear that New Worlds could be found on your doorstep too. Cesi and his friends, to an even greater extent than the pioneering botanists of the sixteenth century, found things in the hills and valleys round his home that presented problems no ancient writers could resolve. They were problems of identification, classification, and nomenclature above all, but also of cause and aetiology.

The language of science was thus liberated from its old bondage to authority and tradition; indeed it could only find adequate exposition in the vernacular, whether Meso-American vernaculars or the local languages that alone provide the terms for the local, the lowly, and the unexceptional. By its very nature, the microscope was especially suited to the examination of the lowly, the everyday, and the seemingly insignificant; no wonder that from the very beginning Galileo, Colonna, and Stelluti should have constantly insisted on the scientific interest and relevance of the tiniest louse or flea. In this regard, it comes as no surprise that the second high point of Stelluti's work with the microscope, illustrated in the *Persio*, should be his examination of the lowly *curculio* beetle that so infested the grain harvests of Tuscany. A more local concern there could not be.

Thus from the global discoveries of the New World came the openness to local and vernacular knowledge, and from the local came the global in turn. One of the most surprising aspects of the work of the Lincei, one soon comes to realize, is its ethnographic range. The region of select knowledge—that is, the region of classical languages and the archaeology, literature, and general culture of the ancient world—is

expanded to the wider and more intimate regions of local cultures. When the Lynxes and their friends write about ancient sports they know that the field of modern games has been even less studied,²² and so they turn their attention to such matters too. Their work is thus deeply concerned with folkways and with the acceptance of popular cultures as much as with the pondering of ancient ones. If ever there was an unnoticed aspect of their work it is this. It offers testimony not to the courtly and exclusive nature of their researches, as has recently been insisted upon,²³ but rather to their belief in the essential humanity of all the sciences. Science can no longer be the exclusive domain it once was; its secrets are essentially accessible, no longer available only to those whose knowledge is predicated on the arcane and elite lessons of the antique. Veiled in classical allusion and wrapped in the shining cloak of panegyric, the Lincei attempted to ensure that whatever threatened to be subversive about their work would never be discovered. But surely the path they charted has profound implications for our understanding of the complex representational strategies and epistemological constraints of early modern science.

Notes

1. Much of this essay derives from my forthcoming book on the study of natural history around Galileo, provisionally titled *The Eye of the Lynx*. More extensive evidence for the essay's arguments will be found there. I am immensely grateful to Caroline Jones for having encouraged and helped me produce this essay in its present form. Here I have deliberately kept the notes to a minimum.
2. See, for example, books such as the Greek and Byzantine scholar Leone Allacci's *Apes Urbanae* (Rome: Grignani, 1633), and the Jesuit Giovanni Battista Ferrari's *De Florum Cultura* (Rome: Paulino, 1633) of the same year. On the latter see especially David Freedberg, "From Hebrew and Gardens to Oranges and Lemons: Giovanni Battista Ferrari and Cassiano dal Pozzo," in *Cassiano dal Pozzo: Atti del Seminario Internazionale di Studi*, ed. F. Solinas (Rome: De Luca, 1989), pp. 37–72; and now, with E. Baldini, G. Continella, and E. Tribulato, *The Paper Museum of Cassiano dal Pozzo, A Catalogue Raisonné, Drawings and Prints in the Royal Library at Windsor Castle, the British Museum, the Institut de France and Other Collections*, series B, Natural History, vol. 1, *Citrus Fruit* (London: Harvey Miller, 1997). Franca Petrucci Nardelli, "Il Cardinal Francesco Berberini Senior e la Stampa a Roma," *Archivio dell' Società Romana de Storia Patria* (Rome: 1985), pp. 138–64, provides an excellent survey of the printing history of the books subsidized by Francesco Berberini in particular.
3. Galileo, *Opere*, XI, pp. 495–96.
4. "Questo è fatto per significar tanto più la nostra divotione a' Padroni et esercitar il nostro particolare studio delle naturali osservazioni," [Giuseppe Gabrieli]. *Il Carteggio Linceo*, in *Atti della Reale Accademia Nazionale dei Lincei, Memorie della Classe de Scienze Morali, Storiche e Filologiche* ser. 6, vol. VII (1938–42), p. 1066, no. 866, Cesi to Galileo, September 26, 1625. This reference seems to me to be indubitably to this sheet, rather than to an early draft of the text of the *Apiarium*. Clara Sue Kidwell's valiant dissertation *The Accademia dei Lincei and the Apiarium: A Case Study of the Activities of a Seventeenth Century Scientific Society* (University of Oklahoma, 1970) is the only detailed study of the *Apiarium* ever made, but unfortunately neither the summary of the context of the work nor the translation are reliable.
5. See, in this volume, Lorraine Daston's "Nature by Design" in which she articulates the move by seventeenth-century natural philosophers from "macroscopic" arguments about external resem-

- blances visible to all humans, to "microscopic" claims about perfections achieved in the interior of animals by God.
6. Beyond the invaluable articles by Van den Berghe in *Messenger des sciences historiques* (Ghent, 1880), pp. 12–32, 189–208, and in the later edition (Ghent, 1881), pp. 160–85, 457–77, see Giuseppe Gabrieli, "Giusto Ricchio Belga: I suoi scritti editi e inediti," in *Rendiconti della Reale Accademia Nazionale dei Lincei. Classe di Scienze Morali, Storiche e Filologiche*, ser. 6, vol. IX (1943), pp. 1–44 (reprinted in Giuseppe Gabrieli, *Contributi alla storia dell'Accademia dei Lincei*, 2 vols. [Rome, 1989], pp. 1133–64).
 7. Justus Riquius, *Apes Dianiae in monumentis veterum noviter observatae*, (Rome: Mascardi, 1625) p. 7:
Hic adyta, & Triviae Virginis esse domum,
Apparet tota diffusae corpore mammae,
Nec tamen est ullo foedera passa thoro.
His alitur mortale genus, vitaeque animantum,
Vitales succos hinc elementa bibunt.
 8. *Ibid.*, p. 6: "Ex sese genita nullo faedata cubili."
 9. *Ibid.*: "Plus tamen est APIBUS tribuit quod virgo pudicis / Grator & Castae [i.e. Diana] casta volucris adest."
 10. *Ibid.*, p. 3.
 11. See Michel Foucault's strictures and comments on the beginnings of biology in *The Order of Things, An Archaeology of the Human Sciences* (New York: Vintage, 1973), passim but especially pp. xii and 159–62. Published originally in French as *Les mots et les choses* (Paris: Gallimard, 1966).
 12. Gabrieli, *Carteggio*, p. 1066.
 13. Caroline Jones points out that "this fixation on the maleness of the chief reproducing bee, a fixation that served to obscure the gender of the animal's actual sex organs, may have been intimately tied to the patronage of those who studied it. That is, because the natural analogue between Pope and Bee was so compelling, the actual sexuality of the bee could not be perceived by the Barberini-eyed Lincei." Correspondence with the author, July 16, 1996.
 14. A point implicit in my argument, which Mario Biagioli has usefully pushed me to foreground more forcefully. Communication with the author and editors, July 16, 1996.
 15. It was precisely in his correspondence with Cesi in the first months of 1626—referring frequently to the *Apiarium* and to their work with the microscope—that Fabio Colonna discusses various possible cures for the continued difficulties Cesi's wife had with her miscarriages and in giving birth to healthy male offspring (e.g., Gabrieli, *Carteggio*, letters of February 13, and March 20, 1626, pp. 1100–01 and 1111).
 16. Again, see Daston's argument in this volume ("Nature by Design") regarding the significance of the move from macroscopic to microscopic arguments and demonstrations.
 17. Galileo's microscope used a convex objective lens and a concave ocular lens, while the "German" one invented by the Dutchman Cornelis Drebbel and brought to Italy by his brothers-in-law Jacob, Abraham, and Egidius Kuffler, was a true compound one using two convex lenses. Galileo, recognizing its potential, was very much taken with the new type.
 18. "Sono stato hier sera col sig. Galilei nostro che habita vicino alla Madalena; ha dato un bellissimo ochialino al Sig. Cardinale de Zollern per il Duca di Baviera. Io ho visto una mosca che il Sig. Galileo stesso mi ha fatto vedere; sono restato attonito" Gabrieli, *Carteggio*, pp. 942–43.
 19. *Ibid.*, pp. 942–43. "Invio a V.E. un occhialino per veder da vicino le cose minime, del quale spero che ella sia per prendersi gusto e trattenimento non piccolo, chè così accade a me. . . . Ma V.E. haverà campo larghissimo di osservar mille e mille particolari, de i quali la prego a darmi avviso delle cose più curiose. In somma ci è da contemplare infinitamente la grandezza della natura, e quanto sottilmente ella lavora, e con quanta indicibil diligenza." Gabrieli, *Carteggio*, p. 942.
 20. Again, I thank Mario Biagioli for pushing me to emphasize this point. He comments, "Of course, one could also expand on the male homosocial imaginary entailed by Cesi's celebration of [male] bee-

dom—an imaginary that was no doubt shared by many of the boys at the Roman court.” Communication with the author and editors, July 16, 1996.

21. Alexandre Koyré, *Etudes d'histoire de la pensée scientifique* (Paris: Gallimard, 1973), p. 53.
22. On this subject, see David Freedberg, “Cassiano on the Jewish Races of Rome,” *Quaderni Puteani*, 3, II (Milan, 1992), pp. 41–56.
23. See especially Mario Biagioli, *Galileo Courtier* (Chicago: University of Chicago Press, 1993).