

Transformations: Studies in the History of Science and Technology
Jed Buchwald, general editor

Mordechai Feingold, editor, *Jesuit Science and the Republic of Letters*

Sungook Hong, *Wireless: From Marconi's Black-Box to the Audion*

Myles Jackson, *Spectrum of Belief: Joseph von Fraunhofer and the Craft of Precision Optics*

William R. Newman and Anthony Grafton, editors, *Secrets of Nature: Astrology and Alchemy in Early Modern Europe*

Alan J. Rocks, *Nationalizing Science: Adolphe Wurtz and the Battle for French Chemistry*

Jesuit Science and the Republic of Letters

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Jesuits: Savants

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One of the more famous “scandals” of eighteenth-century science, and one that persisted for more than 100 years, involved the strange case of Father Maximilian Hell. This talented and respected director of the Vienna Observatory headed one of the teams that set out with great fanfare to observe the 1769 transit of Venus. When the event passed and Hell failed to make his observations immediately public, a malicious rumor arose: The Jesuit either had not carried out observations or, it was even whispered, was awaiting the publication of his colleagues’ observations in order to adjust his own.¹

The libel—apparently originating with Jérôme de Lalande, who seems to have taken umbrage at Hell’s reluctance to transmit his results directly to him—was given credence, in no small part, because Hell was a Jesuit. Such willingness to discredit an otherwise respected member of the scientific community was symptomatic of the highly charged feelings the Jesuits elicited on the eve of the dissolution of the Order.² Yet the bizarre mixture of admiration, aversion, envy, and malice toward the Society of Jesus and its members did not originate in the eighteenth century. From its very inception in 1540, the Jesuit Order engendered deep-seated ambivalence among friends and foes alike. That ambivalence created an atmosphere in which widespread regard, even reverence, for the intellectual achievement of the Jesuits coexisted with repeated attempts to denigrate the Order and everything its members might do.

The Jesuits “were everywhere” (so one historian has summed up the extent of their presence), “especially under the beds of zealous Calvinists and skeptical philosophers.” They were “pervasively feared and loathed as no single group of priests and thinkers had ever been before, and as none would be again until the Bolshevik Commissars of the 1920s.”³ As unlikely

as this analogy may seem, it underscores the nature of the contests that embroiled the Jesuits during the early modern period, which were as much over cultural hegemony as over religion—though one should not assume, as historians often do, that the former was merely an extension of the latter. Be this as it may, the violent reaction to the Jesuits in both realms was such that before long affixing the adjective “Jesuit” to whatever cultural production the Order happened to be engaged in was sufficient to conjure up nefarious and biased designs.

The aim of this introductory chapter is to get past the stereotypes that surrounded the Society of Jesus during the first 200 years of its existence and evaluate the scientific dimension of its intellectual contribution, independent of its religious mission. It is my contention that, by and large, the scholarly activities and aspirations of Jesuits were indistinguishable from those of other contemporary savants, secular or ordained, irrespective of denomination. True, constraints on the pursuit of secular learning were more stringent among Jesuits, as were the mechanisms regulating their teachings, publications, and contacts with outsiders. But this cannot be automatically construed to mean that the Jesuits harbored a greater number of reactionary, prejudiced, or bigoted scholars than did other Catholic orders (or, for that matter, the various Protestant churches). Indeed, my research indicates that while scholarship often served partisan goals in the charged religious atmosphere of the early modern period, Jesuit scientific practitioners as a group seem to have resisted the temptation to yoke science to other ends as well as did practitioners of any other religious denomination.

This conception of the Order as comprising many men of letters is controversial, challenging the received view that they ought to be considered first and foremost Jesuits. Likewise, the corollary attempt to exculpate numerous members from the charge that they were intractable enemies of modernity is certain to draw some fire. Almost as old as the Society of Jesus itself is the commonplace that its members’ blind allegiance to scholasticism and Catholic dogma incited them, time and again, to obstruct “truth” by persecuting those committed to seeking it out. Though the condemnation of Galileo is perhaps the most celebrated scientific persecution blamed on the machinations of the Jesuits, opposition to Cartesianism, to atomism, and to other aspects of the new science in Catholic countries was also, from the start, pinned by many proponents of such ideas on Jesuit inspiration or orchestration.

Nowhere was the willingness to believe the worst about the actions and intentions of members of the Order more pronounced than in Protestant countries, where anti-Jesuit sentiments usually ran high. Consider, for example, the scorn with which Henry Oldenburg greeted Ignace-Gaston Pardies’s respectful and merited criticism of Newton’s theory of colors in 1672. “You see by the enclosed how nimbly that sort of men is to animate upon new Theories,” the secretary of the Royal Society spouted in his cover letter to Newton, as if to condition the latter’s mind.⁴ Ironically, several years earlier Oldenburg himself had been similarly forewarned (by John Beale, no less) to greet any Jesuit publication with distrust before the benefit of a fair hearing. The Jesuits “are to be suspected in point of candor, and severe truth,” Beale wrote, “till your example and strict examination can render them cautious.” Indeed, so taken for granted was the alleged trickery of the Jesuits in harnessing their intellectual endeavors to religious and political ends that even the most seasoned minds were cautioned to read them with utmost care.

Such prejudice persisted into the nineteenth century and beyond. Even today, the historical literature is rife with accounts rooted in early modern conceptions of the Jesuits as ultraconservative or, more recently, as dull plodders unworthy of serious inquiry. Consider, for example, Paolo Rossi’s dismissive attitude toward efforts to credit the Jesuits with more than a marginal role in ushering in modernity. “It is fashionable to praise the science of the Jesuits,” he recently noted. But while “their efforts were undeniably deserving of respect,”

it is equally undeniable that, beyond all attempts at reevaluation, astronomy after the second condemnation of Galileo’s writings in 1633 concentrated more on calculation and less on cosmology and that biology involved the analysis of organs and structures more and focused less on general theories concerning animate things. The “science” of Francesco Lana Terzi and Daniello Bartoli and the monumental works of Athanasius Kircher attempted a sort of grandiose compromise between the findings of the new science and the legacy of magical naturalism. . . . Science returned to an examination of the “marvelous”; once more it became a “pleasurable” activity important for its “utility.” Scientific knowledge went back to being precisely what Francis Bacon had said it should not be: “a couch whereupon to rest a spirit, a terrace for a wandering and variable mind, a shop for profits or sale.”⁵

Rossi’s comments recall past views, such as the one that shaped the article on the Jesuits penned for the 1911 edition of the *Britannica*. Notwithstanding the Order’s many endeavors, the authors noted, it was devoid of

"really great intellects." Compared with the likes of Descartes, Pascal, and Voltaire, who transformed philosophy and religion, the Jesuits could boast of at best a "respectable mediocrity." And why? All because of "the destructive process of scooping out the will of the Jesuit novice, to replace it with that of his superior . . . and thereby tending, in most cases, to annihilate those subtle qualities of individuality and originality which are essential to genius."⁶ But we can trace this sort of analysis back further still, to Helvetius, a former student of the Collège Louis-le-Grand, who, while praising the Jesuit contribution to education, neatly explained why the members of the Order fell short of greatness:

The Jesuits afford a striking example of the power of education. If their order has produced few men of genius in the arts or sciences; if they have no Newton in physics, no Racine in Tragedy, no Huygens in astronomy, or Pot in chymistry; no Bacon, Locke, Voltaire, Fontaine, etc. it is not that the religious of this order never find among their scholars those who discover the greatest genius. The Jesuits moreover, from the tranquility of their colleges, have not their studies molested by any avocations, and their manner of living is the most favorable to the acquisition of talents. Why then have they given so few illustrious men to Europe? It is because surrounded by fanatics and bigots, a Jesuit dares not think but after his superiors: it is, moreover, because forced to apply themselves for years together to the study of the casuists and theology, that study, so repugnant to sound reason, destroys its efficacy on them. How can they preserve on the benches a just judgment! the habit of sophistry must corrupt it.⁷

On the rare occasions when Jesuits reflected on their order's contribution to secular learning, they reached similar conclusions—though, not surprisingly, without attributing it either to the mediocrity of the members or to their broken spirits. "Our Society values, and has contributed to literature, to culture," Gerard Manley Hopkins insisted,

but only as a means to an end. Its history and its experience shew that literature proper, as poetry, has seldom been found to be to that end a very serviceable means. We have had for three centuries often the flower of the youth of a country in numbers enter our body: among these how many poets, how many artists of all sorts, there must have been! But there have been very few Jesuit poets and, where they have been, I believe it would be found on examination that there was something exceptional in their circumstances or, so to say, counterbalancing in their career. For genius attracts fame and individual fame St. Ignatius looked on as the most dangerous and dazzling of all attractions.⁸

Predictably, the privileging of novelty and so-called consequential figures has led modern scholars—who fail to detect "greatness" among members of the Order—to adopt a patronizing view of Jesuit scientific endeavors:

"mildly interesting, if unenviable, ancillary roles in a number of great moments in that grand story," as summed up by one scholar.⁹ Recently, Isabelle Pantin provocatively employed a rhetorical question—"Is Clavius worth reappraising?"—to title her review essay on the "father" of Jesuit mathematics, so that the reader is hardly surprised to "discover" that he is not.¹⁰ But whereas Rossi in the above quotation regretted the pursuit of the "marvelous" science practiced by Kircher and his colleagues at the Collegio Romano (which science is said to have been practiced by Jesuits more generally), what bothered Pantin was the alleged failure of teachers and textbook writers such as Christopher Clavius to make any significant contributions to science.¹¹ This dismissal of Jesuits as "mere" pedagogues has been reinforced by the general tendency of scholars to view early modern universities as bastions of scholasticism inimical to new ideas or, at best, as institutions successful only in training clerics and in imparting basic knowledge to the upper classes. Absent from both scenarios is an educational mission, no matter how limited, to advance the boundaries of scientific knowledge or to contribute appreciably to the formation of great thinkers. But perhaps the most interesting aspect of this historical overview is that the inability of such "academics" to measure up to the likes of Galileo, Descartes, or Newton is viewed as something akin to moral failure, as if they might have reached such heights if only they had been more relentless in their search for truth.

The Jesuit context affords an excellent opportunity to appraise the contribution of a traditional institution of higher learning to "modernity," since, arguably, scholasticism was more rampant in the colleges of the Society than elsewhere, and the vast majority of Jesuit philosophy teachers (as well as many offering instruction in the mathematical sciences) were undistinguished. I shall have more to say on the quality of Jesuit teachers and on the nature of their instruction, but first other important topics bearing on the Jesuit educational context require elucidation. Essential in this context is the recognition that the Order embraced the educational *ministerium* only inadvertently, and that (understandably) its architects were from the outset explicit in enjoining the membership to consider secular studies only as a means to an end. "Teaching the youth pertains to the ministry of the word of God," wrote Jerónimo Nadal c. 1565. "[The Jesuits'] only reason for opening the schools was so that with this hook they might draw students of literature to piety." Two years later Nadal elaborated: the

Society "would never have undertaken the task of giving lessons in colleges, if it did not also understand that by so doing it was also giving a moral training. . . . So for us lessons and scholarly exercises are a sort of hook with which we fish for souls." Such a view, O'Malley has aptly concluded, confirms that the Jesuits "looked more to formation of mind and character, to *Bildung*, than to the acquisition of ever more information or the advancement of the disciplines."¹²

One is tempted to interpret Nadal's statements as a mandate to subjugate all intellectual endeavors to the religious and political aims of the Order, a purative *reductio scientiarum atque morum ad fidem catholicam*, reflected by the recurrence—nearly 300 times—of the Order's motto *ad maiorem Dei gloriam* in the *Constitutions*. This, according to Scaglione, signified "mortification of the human and social needs and subordination of knowledge, truth, and values to an external, abstract goal: allegiance to the Church and Roman faith." Small wonder, then, that modern scholars still maintain that "Jesuit science" should be viewed within the lens of the Order's religious mission. Thus, Harris argued, if certain members of the Society "found themselves deeply engaged in certain forms of early modern science . . . it was because they and their Jesuit superiors considered these forms of scientific practice to be legitimate and valued activities for members of the Society." Harris continues: "Certainly, for the first two hundred years of the Society's existence—and probably for its entire existence—one cannot speak of science as an autonomous cultural activity within the Society. Thus we may assume that the methods, practices, and goals of scientific activity within the Society were subservient to its religious program."¹³

Irrespective of the subservient conception of learning envisaged by the founders of the Society, subsequent generations of Jesuits faced changing circumstances. As education became central to Jesuit life, and as the Order increasingly capitalized on its members' reputation for erudition, certain adjustments in the official attitude toward learning became necessary. "Their strong religious motivation notwithstanding," Scaglione also observed, the Jesuits embraced the traditional ideals of Renaissance humanism, and "the interest in the humanities gradually ripened into genuine dedication" among members—albeit such activities "always lived side by side with the more basic concern for the ultimate point of reference, to wit, theology, or at least a strong confessional commitment." Yet, as Blum per-

ceptively pointed out, even though all learning, in principal, was "purpose-bound, apologetical, and subordinate" to the Order's higher goals, "if absolutely everything is done for the greater glory of God . . . then human activity becomes a wide field for free development." The Jesuits, in other words, stumbled upon a variant of the doctrine of double truth: "If the orthodox faith is not touched . . . the sciences may pursue their immanent questions unhampered."¹⁴

Clearly, then, I find the common perception of Jesuit scientific activity as motivated by religious concerns problematic. In principle it is true, as one scholar put it, that "one was a Jesuit in order to defend the Council of Trent, not to make one's scientific career an end in itself."¹⁵ But to further conclude that most Jesuit practitioners pursued their scientific studies strictly in conformity with the religious ends of the Order is untenable. Aware of the pious pronouncements of Jesuit practitioners, I nevertheless view many of them as rationalizations—a practice common among early modern clerical savants of all denominations. Yes, there may have been greater urgency for such lip service among Jesuits, in view of St. Ignatius Loyola's determination to "plan and regulate, macro- and microscopically" all aspects of Jesuit life.¹⁶ But there is no mistaking the zeal with which many members embraced secular studies. And in view of this zeal, particularly the profundity of the involvement of the members of the Society in the sciences, I should like to address an issue that has never received proper scholarly attention: the *identity* of the Jesuit practitioners. All too often, it seems, Jesuit individuality is presumed to be an oxymoron. Yet, as Diderot facetiously but incisively mused long ago, the matter was far from obvious: "Qu'est-ce qu'un Jésuite?" he asked in the *Encyclopédie* article on "Jesuits." "Est-ce un prêtre séculier? est-ce un prêtre régulier? est-ce un laïc? est-ce un religieux? est-ce un homme de communauté? est-ce un moine? c'est quelque chose de tout cela, mais ce n'est point cela."¹⁷

Diderot understood the Jesuit mentality better than most. As well as being a veteran of several celebrated battles with members of the Order, he was a former pupil who had come close to joining. Beyond what concerned him in the above-mentioned article, though, Diderot understood that the identity of the scholar preceded his imprinting as a Jesuit. After all, one entered the Order at age 16, at the culmination of a rigorous period in the Collège, where the love of learning was instilled by enticing young students with accolades and glory—a cornerstone of the contemporary pedagogical

system. The incongruity between the habits inculcated in the schools and those expected from a Christian—not to mention a cleric—were often commented upon, but never so poignantly as by the English spiritual writer William Law in his 1728 denunciation of “our modern education”:

The first temper that we try to awake in children is pride, as dangerous a passion as that of lust. We stir them up to vain thoughts of themselves, and do everything we can to puff up their minds with a sense of their own abilities. Whatever way of life we intend them for, we apply the fire of vanity of their minds, and exhort them to everything from corrupt motives. We stir them up to action from principles of strife and ambition, from glory, envy, and a desire of distinction, that they may excel others, and shine in the eyes of the world. We repeat and inculcate these motives upon them till they think it a part of their duty to be proud, envious, and vainglorious of their own accomplishments. And when we have taught them to scorn to be outdone by any, to hear no rival, to thirst after every instance of applause, to be content with nothing but the highest distinctions, then we begin to take comfort in them and promise the world some mighty things from youths of such a glorious spirit. . . . That this is the nature of our best education is too plain to need any proof. . . . And after all this, we complain of the effects of pride, we wonder to see grown men acted and governed by ambition, envy, scorn, and a desire of glory, not considering that they were all the time of their youth called upon to all their action and industry upon the same principles. You teach a child to scorn to be outdone, to thirst for distinction and applause, and is it any wonder that he continues to act all his life in the same manner?¹⁹

Diderot still fondly recalled in 1760 the prizes and praises showered on him more than 30 years earlier at Langres. And had he proceeded into the Jesuit Order (or any other order) he might well have struggled with the irreconcilable passions that perturbed his older contemporary, the future abbé Prévost, who had been a student of the Jesuits at Hesdin from 1711 to 1718 but who failed twice to follow through the Jesuit novitiate. “I know the weakness of my heart,” Prévost admitted shortly after he was professed, “and I understand how important it is for my peace not to apply myself to sterile studies which will leave my heart dry and enfeebled. If I want to be happy in religion, I must conserve in all its force the inspiration of the grace which brought me to it. It is necessary that I unceasingly take care to remove all that could weaken it. I know only too well—I realize it daily—how far I can sink if I lose the great rule from sight for a single moment, or even if I look with the least complaisance on certain images which all too often intrude into my mind, and which still have great power to allure me, although they are half blotted out.” As McManners remarked in regard to this passage, while the “young in their naïveté can scorn the glories of the

world and believe that they will continue to do so,” Prévost “knew from the start the fickleness and ambiguity of vocation.”¹⁹

The ambiguity that troubled Prévost was undoubtedly shared by many Jesuit savants who, while rarely admitting its effect on their vocation and even more rarely committing their sentiments to paper, nonetheless left sufficient testimony of the fervor with which they pursued their secular studies, with the occasional hint of the anxiety it caused them. Thus, when in 1671 Pardies sought to establish contact with the Royal Society, he confided to its secretary his “extraordinary inclination towards the sciences,” which stirred in him “an extraordinary respect and regard for people who work to improve them.”²⁰ As we shall see below, such zeal proved for him a life-long source of consternation. Twenty-five years earlier, Giovanni Battista Riccioli had articulated his scientific zeal more forcefully. Writing in 1646 to Athanasius Kircher, the Bolognese professor of theology affirmed his vocation as a theologian while acknowledging that he had been fascinated by astronomy ever since his student days under Biancani. Indeed, Riccioli remarked, although his students and his superiors implored him to turn his attention to theological writings, he desisted, with the result that he was exempted from such a course and permitted instead to devote himself to astronomy for two years. As if to excuse his conduct, Riccioli rationalized that numerous Jesuits published in theology, while only a handful applied themselves to astronomy. And, having already amassed a substantial amount of material, he allowed himself to reiterate his stronger commitment to astronomy than to theology.²¹ Publicly, too, Riccioli acknowledged his deep devotion to scientific investigation. In the introduction to the *Almagestum novum*, for example, he confessed that he “could never extinguish the enthusiasm for astronomy” once he had experienced it, and that eventually his enthusiasm had prompted his superiors to sanction his preferred course a decade and a half later: “We are devoted to these studies to the glory of God, first by request, and then by explicit order of the superiors.”²²

While the powerful grip of secular learning (scientific or otherwise) on many Jesuits does not in itself cast a shadow on their religious commitment, it thrusts into the foreground their motivation for joining the Order and any conflict that might have resulted from their pursuit of profane studies. As I have noted, the architects of the Society unambiguously enjoined the members to consider secular studies only as a means to an end. Nevertheless, the

reputation that many Jesuits acquired for erudition enhanced the prestige of the Order and increasingly enticed talented individuals who yearned to excel in learning—though whether for the greater glory of God or for their own greater glory it was sometimes difficult to tell. This attraction to the Order was precisely what Juan Alfonso de Polanco had predicted: “Although Jesuits should not try to persuade anybody to enter the Society, especially not young boys, their good example and other factors will, nonetheless, help gain ‘laborers to the vineyard.’”²³ The authorities, not blind to the imminent danger of misapplied talents, took great pains to ascertain the motivation of aspirants. In principle, only those found firm in their vocation were to be allowed to proceed with their studies. Yet the eagerness to recruit bright young scholars, combined with the inordinate difficulty of distinguishing between religious zeal and hankering for scholarly fame in one so young, made this a particularly difficult task. Nor were Jesuit authorities eager to dismiss those who, once admitted, retained youthful excesses or failed to keep a proper balance between scholarship and religious vocation.

Examples abound of men who were turned away for precisely these failings. Pierre-Daniel Huet’s case, for example, may have been uncommon insofar as he was older than most candidates (having applied for admission after he had left school and made a name for himself), but the considerations for his rejection were not.²⁴ Having experienced a crisis of conscience that made him realize how “the pursuit of vulgar objects abstracts the mind from the worship of God and the contemplation of the celestial life, and even from a rigorous correction of the manners,” Huet sojourned to La Flèche to join the annual retreat of the Jesuits. The serenity he experienced there fortified his conviction that he had allowed himself to be “borne away by the fire of youth, the allurements of the world, which by their variety so filled my breast, and closed up all its inlet with an infinite number of thoughts, that it gave no admission to those intimate and charming confidences with the Supreme Being”—and he thus asked to be admitted to the Order. To his surprise, his old teacher Pierre Mamburn, having carefully considered the matter and being “well acquainted both with [Huet’s] disposition and manners, and with the discipline and rules of his order,” discouraged him; “a mode of life absolutely dependent upon the will of another, was totally alien from the freedom of [his] spirit.” At the turn of the eighteenth century, a more typical aspirant, Guido Grandi, was turned away for similar hubris. He had discovered mathematics while a student at

the Jesuit College in Cremona under the private tutelage of Girolamo Saccheri, and, wishing to follow in the footsteps of his mentor, sought admission. The authorities, suspecting Grandi’s zeal was misdirected, recommended he seek the “truth” elsewhere—which he promptly did, joining the Camaldolese Order instead.²⁵

But such official scrutiny also failed, for the very reasons given above. Jean Bonfia is a case in point. The future astronomer joined the Order in the 1650s because, his biographer recounted, “he found nothing more conforming to his love of study.”²⁶ Nor was he unique, though the dearth of documentation makes it difficult to impute motivation with certainty. Discussing the case of several mid-eighteenth-century Bohemian practitioners, one historian wonders whether they “were in any real sense heirs to and participants in Jesuit intellectual relations, or whether entry into the Society was merely an expediency resulting from limited educational and career opportunities.” Perhaps McManners’s general observation regarding recruits to Catholic religious orders holds true for some Jesuits as well: “. . . they wanted to lead a leisured existence with freedom to pursue their own interests, not easy in a society where tradition, hierarchy, and family constrained individuality.”²⁷ For their part, the authorities rationalized that time and discipline would set straight the priorities of their precocious pupils. In this they often miscalculated. But before elaborating on the repercussions of such miscalculations, I should like to consider the practical implications of the perceived incompatibility between the Jesuit vocation and the pursuit of secular learning.

The propriety of single-minded application to scientific studies was problematic for many Jesuits not so inclined. For them, such studies were at best extraneous to the true needs and concerns of the Order; at worst they were harbingers of pernicious doctrines, especially as the seventeenth century progressed. More acute, though, was an even more immediate dilemma. As scientific talent manifested itself early, so did the desire of young Jesuits to devote themselves to such studies—even before they completed the philosophy course. Yet such eagerness to “specialize” was unlikely to elicit much sympathy. On the contrary, at this early stage in their career, scientifically minded Jesuits were most vulnerable to harassment from zealous colleagues and superiors who generally failed to appreciate the seemingly misguided passion of their young confrères. Nor were the accomplishments of budding mathematicians and astronomers sufficiently distinguished at this early

stage—or sufficiently public—to attract outside support (which was quite often necessary to guarantee their pursuit, since superiors were generally eager to acquiesce to potential patrons).

The vicissitudes of an aspiring ordained mathematician may be glimpsed in the early career of a member of another religious order, the Jesuate Bonaventura Cavalieri. Having received minor orders in 1615, the 18-year-old Cavalieri was dispatched the following year to Pisa, where he met Benedetto Castelli and became his disciple. Nor only did Castelli introduce his young protégé to Galileo; upon taking leave of his teaching position in Pisa in 1618 in order to teach in the Medici court, he persuaded Christina of Lorraine to intercede with Cavalieri's superiors to allow his pupil to substitute for him. What was supposed to be a summer job lasted two years, in the midst of which, in 1619, Cavalieri applied directly to the Senate of the University of Bologna for a chair of mathematics that had been vacant since Magini's death two years earlier. He was disappointed, in part because he had failed to secure Galileo's support. By the middle of 1620 his superiors ordered him to Milan to proceed with his theological studies. "I am now in my country," the despondent Cavalieri wrote Galileo a year later, "where there are these old men who expected of me greater progress in Theology as well as in preaching, you can imagine how unwillingly they see me so fond of mathematics." In the spring or summer of 1623 he was appointed Prior of S. Pietro in Lodi, from whence he launched a resolute campaign—availing himself of the good offices of, among others, Castelli, Galileo, and Cesare Marsili—designed to propel him into a professorship in mathematics. His efforts bore fruit only in 1629, when he was appointed to the chair in Bologna.²⁸

Cavalieri's experience mirrored those of numerous Jesuits, though only careful scrutiny of extant correspondence enables us to piece together the tribulations of young Jesuits desperate to secure opportunities to devote themselves to scientific studies. Girolamo Saccheri is a case in point. He appears to have acquired some reputation for mathematical ingenuity early on, but upon completing his studies in Genoa he was sent to teach grammar in Cremona. In 1690, however, Saccheri was transferred to Milan to study theology. There he met Tommaso Ceva, the Professor of Mathematics, who took it upon himself to advance his confrère's career. It was at Ceva's behest that Saccheri published (in 1693) his *Quaesita Geometrica*, a small volume of solutions to several problems posed by Count Ruggerio

di Ventimiglia that evidently was calculated to procure Saccheri patronage by demonstrating his ingenuity while paying homage to the nobleman and the Ceva family. Shortly after publication, Ceva forwarded a copy to Vincenzo Viviani in a further attempt to bolster Saccheri's contacts and reputation. The ensuing correspondence between the Jesuit and Galileo's last disciple proved short-lived, primarily because—as Ceva assured Viviani—Saccheri was preoccupied with his theological exercises. Subsequently, to Ceva's regret, Saccheri was not permitted to devote himself wholly to the study of mathematics but was sent instead by his superiors to teach philosophy and theology in Turin. Not until 1699 were Saccheri's friends and patrons able to secure for him the professorship of mathematics at the University of Pavia.²⁹

Jean Bonfa's struggle was more protracted. Through much of the 1670s and the 1680s, the French Jesuit tried to keep up a variety of astronomical pursuits alongside his mandatory teaching of philosophy at Grenoble and, later on, of theology at Avignon. In the late 1670s Bonfa attempted to enlist the king's confessor, La Chaize, and the professor of mathematics at Clermont, Jean Fontenay, to his cause. Subsequently, the two proved instrumental in communicating his scientific work to the Académie des Sciences and in effecting his appointment as Royal Professor of hydrography at Marseilles. The appointment proved short-lived. By early 1683, Bonfa was back teaching theology in Avignon. And though he was permitted the following academic year to add the teaching of mathematics to his duties, this was but a temporary dispensation. Not to be deterred, Bonfa renewed his efforts to secure support from Parisian and Roman Jesuits as well as from the papal representatives in Avignon. At last he succeeded, and for the academic year 1687–88 he was appointed professor of mathematics at Avignon—a position he held until 1712.³⁰

Equally vigorous were the efforts of Adam Kochanski to secure the conditions that would allow him to pursue his cherished scientific studies. Having entered the novitiate at Wilno in 1652, Kochanski fled the advancing Russian forces three years later. After a brief sojourn to Würzburg, where he helped Caspar Scott see *Magia universalis naturae et artis* through to publication, Kochansky proceeded to Molsheim to study philosophy and metaphysics (1655–1657), then to Mainz to study theology and teach mathematics. Immediately upon completing his theological studies in 1664, Kochansky embarked on a campaign aimed at preventing his

forced return to Poland and allowing him to devote himself to scientific research. He entreated Athanasius Kircher to intercede on his behalf with General Oliva, a ploy which resulted first in his being sent to teach in Bamberg and then, in 1666, in his being summoned to Florence to serve as mathematics tutor to Duke Ferdinand de Medici and his brother Leopold. In 1669, however, the happiest period in Kochansky's life came to an end when Oliva ordered him to Prague. Predictably, no sooner did Kochansky begin teaching mathematics there than a rift with the local superiors occurred. Not only did he avoid the tasks of pastoral care; he demanded suitable quarters for his scientific investigations, employed non-Jesuits, "owned private, unsupervised funds from his benefactors for scientific purposes," and "did not bring the College any evident profit." Small wonder that his colleagues attempted to get rid of him. Persisting in his refusal to return to his native country, Kochanski moved among various colleges in Bohemia. A fresh effort by the Lithuanian province to recall the recalcitrant Jesuit finally resulted in his being sent to Wrocław in 1676. His priorities found no more favor there than they had in Prague, and a conflict was averted only when, in 1678, Jan III Sobieski requested that Kochansky be assigned as tutor to his son. The firebrand finally arrived in Warsaw in 1680.³¹

The struggles by many Jesuit practitioners en route to establishing a scientific vocation were only one aspect of the tribulation they endured. Multiple forms of obstruction from within the Order existed. Many of these impediments were related to the need to share living quarters with less understanding colleagues who held clashing ideologies. We know, for example, that in the late 1580s François Aguilón "constructed spheres, astro-labes and other 'mathematical' . . . tools. He had collected all parts in the attic and had only to put the last touch to the work when he found it all scattered, partly broken, and useless. Of course he regretted the time wasted but he did not complain nor did he allow investigations to discover the culprit."³²

Again, examples drawn from other religious orders could shed light on similar attitudes and practices among the Jesuits. For instance, in 1696 the young Minim Louis Feuillée complained to the Royal Astronomer Cassini that his Provincial (i.e., overseer of his province) had confiscated a clock he had built and several books on astronomy "as being a waste of time."³³ Nor were such attitudes reserved only for junior members of religious orders.

When in 1670 John Locke visited the cell of the Capuchin Père Cherubin at the Order's convent on Rue St. Honoré in Paris, he was astonished at how such a talented optician was treated: "The Capuchins are the strictest and severest order in France," Locke recorded in his diary, "so that to mortify those of their order, they command them the most unreasonable things, irrational and ridiculous. . . . As soon as they find any one to have any inclinations any way, as Père Cherubin in optics and telescopes, they take from him all that he has done, or may be useful to him in that science, and employ him in something quite contrary; but he has now a particular lock and key to his cell, which the guardian's key opens not."³⁴

Mirroring the perceived futility of a Jesuit's embracing secular studies was the Order's ambiguous attitude toward publication. The *Constitutions* were rather cryptic on the subject, merely pronouncing that "one who has talent to write books useful for the common good" may be allowed to do so. But the architects of the Order were explicit in articulating their mind on the subject, and their predisposition proved no less constraining with respect to the ability of future members to enter into print than did their promulgations regarding the need to shun novelty and defend the teachings of Aristotle and Aquinas. Cognizant of the inherent pitfalls of authorship, Alfonso Salmerón expressed diffidence regarding his own qualifications as an author, going so far as to call publishing "foreign to the Jesuit way of life" and incompatible with the Jesuit vocation: "We are called to a way of life characterized chiefly by simplicity, modesty, and unrestricted charity to our neighbor," he thundered. And though "the publication of books is not in itself incompatible with these qualities; it nonetheless can be an obstacle to more excellent works of charity and at times a distraction from them."³⁵ True, both Ignatius and Nadal encouraged publication of books tending to combat heresy or "guide souls to goodness and devotion," as the latter put it, but the publication of secular works was another matter.³⁶ However, in the 1590s—by which time the scholarly output of the Jesuits had reached alarming proportions, partly because of the need to provide textbooks on all subjects and partly because of the Jesuits' embroilment in numerous learned quarrels—General Acquaviva encouraged Suarez to publish but attempted to bridle the scholarly output of other members of the Order. "I am taking care not to allow the number of authors to grow," he wrote, further cautioning that "the publications of our Fathers are multiplying to such extent that we must moderate their zeal, laudable as it is, and we must be

less easy about giving permissions" for new works. Likewise, in 1595 he informed the Provincial of Toledo: "... we have considered limiting these permissions, since we see our appetite for publicity increasing these last few years. It would be wiser not to grant, at least for the moment, the authorization that Father John de Salas asks, especially since Father Vasquez, Suarez, and Molina are writing on the same subject."³⁷

Additional work is necessary to ascertain the reasons for the preponderance of *scriptores* and established professors among Jesuit authors. Telling in this respect is that less than 10 percent of the 244 Jesuits listed in Charles Lohr's *Latin Aristotle Commentaries: Renaissance Authors* ever ventured into print, while a handful of Parisian *scriptores* in the eighteenth century were "responsible for the majority of Jesuit publications other than missionary writings." Taking a broader view, Harris, too, notes the disproportionate representation of relatively few Jesuits among scientific and philosophical authors, with some 12 percent responsible for more than half of all Jesuit writings (including unpublished ones).³⁸ Clearly, then, for most Jesuits publication was the exception, not the norm—but not necessarily because they had nothing to contribute. I shall return to the constraints apropos publication, but here I wish to point out the corollary that Jesuit scientific production, especially before 1700, for the most part assumed the form of textbooks, compendia, and other reference books, not specialized treatises. This was hardly a coincidence. Censorship, including self-censorship, obviously accounted for the absence of many specialized—and "novel"—publications, as we shall see below. In addition, the prejudices regarding authorship that animated the architects of the Order continued to exert influence on subsequent generations; even that vague statement in the *Constitutions* permitting those with a "talent to write books useful for the common good" to do so was interpreted narrowly. The experience of André Tacquet was typical. Having presented General Goswin Nickel with a copy of his innovative *Cylindricorum et annularium libri IV*, Nickel responded by suggesting that Tacquet channel his talents into composing a mathematical manual for Jesuit students.³⁹ If the advice was not intended to disparage Tacquet's contribution, it nonetheless mirrored the official preference with respect to secular publications. Certainly, henceforth Tacquet's publications were invariably in the form of textbooks or compendia. General Carafa, too, appears to have endorsed similar views, for in 1648 he encouraged the young Francesco

Eschinardi to write a *Cursus physico-mathematicus*.⁴⁰ Naturally, even an "invitation" to write a textbook necessitated release from other duties or an established teaching position. For many years Eschinardi was not the beneficiary of either, and the book was not published until 1684. Along the way, the prospective Jesuit author had to weather numerous duties (and discouragements), as did Claude François Milliet Dechalet, who taught mathematics in Lyon between 1657 and 1660 and published his celebrated textbook on Euclid that last year. Dechalet was already at work on a much more ambitious textbook, *Cursus seu mundus mathematicus*, but it proved long in coming. He was dispatched on a mission to Turkey, and after his return he was assigned other duties. As Dechalet intimated to Huygens in 1665, he did not know when he would be in a position to complete the third part of his book, for his superiors had assigned him to teach theology. Only after Dechalet resumed his teaching of mathematics—first in 1669–70 as the King's professor of hydrography, then as a professor in Lyon and in Paris—was he able to work on his *Cursus*, which eventually appeared in 1674.⁴¹

Though original contributions could conceivably be "sneaked" into textbooks and other compendia, the medium was understandably restrictive. Indeed, beleaguered Jesuit authors often substituted erudition and exhaustiveness for novelty—a fact duly noted by critics quick to deride the size and pedestrian nature of most tomes. Joseph Scaliger pointed the way for such criticism when he targeted Martin-Antoine Del Rio's massive *Disquisitionum Magicarum Libri VI* (Mainz, 1593). It was an erudite book, Scaliger grudgingly admitted, but uncritical, its author a mere "collector of knowledge rather than a truly learned scholar." In no small part, Scaliger's judgement was colored by his enmity toward the Jesuits in general, and by his antipathy toward Del Rio in particular, for that "*stercus Diaboli*," as Scaliger dubbed him, not only helped win back Justus Lipsius to Catholicism but "belittled Scaliger's exposure of Pseudo-Dionysius as derivative before attacking it as unfounded."⁴² Scaliger's attitude presaged a growing chorus of denigrators of the bulky treatises that became the trademark of the Jesuits. Seth Ward, Savilian Professor of Astronomy at Oxford, recalled in 1654 that his initiation into the analytical methods of Viète, Harriot, and Descartes had been directly proportional to his deliverance from the "verbose way" and huge tomes of the likes of Clavius: "I was presently extremely taken with it [the symbolic way], finding by this

means, that not only the substance of those vast Volumes might be brought into the compasse of a sheet or two, but that the things thus reduced were more comprehensible and manageable." Six years later, Giovanni Alfonso Borelli showed outright disdain for Riccioli's *Almagestum novum*, which he regarded as "too expensive, too bulky, and too dull"—"a mere collection of what had already been previously published by others."⁴³ Less hostile, but to the same effect, was the concluding sentence of the reviewer of Dechales's *Cursus* in the *Philosophical Transactions*: "... what the Author hath performed *beyond* others, and how much also he hath borrowed *from* others without taking notice of his Benefactors, I must leave to the Intelligent and well-read Perusers of this Work to Judge."⁴⁴

A critical factor in the proliferation of textbooks during the seventeenth century—and the reason for the authorities' predilection for the format—was the increasingly rigid attitude toward novelities that doomed most attempts by Jesuits to produce innovative, specialized treatises. Both the *Constitutions* and the *Ratio Studiorum* had explicitly warned members to shun novelities and follow Aristotle and Saint Thomas in their philosophical and theological studies. To ensure submission, philosophy professors were to be removed from their posts if found to be "too prone to innovations, or too liberal in their views."⁴⁵ In 1564 the young Benito Pereira put it as follows: "One should not be drawn to new opinions—that is, those which one has discovered—but one should adhere to the old and generally accepted opinions. In one's teaching one should avoid sophistic philosophizing and follow the true and sound doctrine." Two decades later, General Acquaviva exhorted members of the Order in similar terms: "Let us try, even when there is nothing to fear for faith and piety, to avoid having anyone suspect us of wanting to create something new or teaching a new doctrine. Therefore no one shall defend any opinion that goes against the axioms received in philosophy or in theology, or against that which the majority of competent men would judge is the common sentiment of the theological schools."⁴⁶

Paradoxically, such regulatory measures notwithstanding, more often than not the Jesuits themselves were charged with begetting novelities during the late sixteenth and early seventeenth centuries. The Iberian philosophers and theologians, in particular, produced an immense scholarly edifice that not only alarmed Protestants but also provoked bitter and protracted disputes with the Dominicans, and it was in no small part in response to

such controversies that General Acquaviva attempted to rein in both "novelties" and the literary production of Jesuits. In 1611 he issued an ordinance that attributed the failure of the Society to achieve its goals, despite great efforts, to an eschewing of uniformity and solidity of doctrine in Jesuit writings. Many members seemed to believe, the General complained, that it was permissible to endorse and publish any opinion so long as it had not explicitly been proscribed; others seemed to think that so long as they conformed to doctrine they could employ their talents freely to discuss a multiplicity of positions. Nevertheless, Acquaviva warned, new ways to defend accepted doctrines invariably attracted new principles, and soon novelty was added to variety. Nor was the General pleased with the increasing penchant to cite a passage from Aquinas, as if adhering to his doctrine, while otherwise believing it. Acquaviva concluded that, since admitting one daring idea often leads to a more daring one until nothing solid and uniform remains, more effective control was required. Two years later Acquaviva addressed an even more impassioned ordinance on the subject, ordering that individuals who maintained obscure and unworthy positions be removed from teaching and given other duties.⁴⁷

A corollary of Acquaviva's claim that one daring idea leads to another might have been that each repressive measure begets another. Certainly the restrictive stance of the Generalate of Muzio Vitelleschi (1615–1645) regarding philosophical and scientific studies⁴⁸ set the conservative tone for the ensuing century. The debilitating effects of excessive control on the spirits and creativity of members was raised as early as 1578 by the German Provincial Paul Hoffaeus during discussions on the desirability of issuing a list of prohibited opinions. Writing to General Mercurian on the need to permit members a modicum of freedom in "matters pertaining to speculation," Hoffaeus insisted:

... it is difficult for the intellect, which is further indulging, to be constrained until it remains within the boundaries of faith and virtue. For otherwise, a great opportunity will be missed for the exercise of ingeniousness if such narrow limits are laid down for those who deal with speculation. Indeed, very many professors, and especially the most talented among them, would be frightened if they were not allowed, for good reasons, to publish their new arguments and opinions in order to explain that which they propose, on the account of their arguing for novelty... for it is the nature of these things and the nature of the best talents that they cannot do otherwise than always to discuss something new. And therefore, the variety of opinions has nothing that offends propriety except in endangering the faith and [causing] scandal.⁴⁹

The late-sixteenth-century bid to impose a list of prohibited opinions came to naught, but Hoffaeus's observation on the likely effect of bridling *libertas philosophandi* proved prophetic. No sooner did Acquaviva issue the 1611 ordinances than officials of the Order began a more concerted effort than ever before to pressure innovators to toe the line. Particularly controversial at the time was the doctrine regarding the fluidity of the heavens. In 1614, Cristoforo Borri, who was among the first Jesuits to propagate the doctrine, ran afoul of his superiors in the Milan for teaching it. It was "improper for Jesuits to comport themselves like *novatores sententiarum*," they railed. Later that year, Acquaviva himself—who sanctioned the silencing of Borri—wrote to the young Christoph Scheiner to similar effect: "One ought not publish against the universal teaching of the Fathers and the scholastic doctors a new hypothesis which, basing itself on yet uncertain observations, maintains that the heavens are fluid, and that stars propel themselves there like fish in the ocean and birds in air."³⁰

In the early years of Virelleschi's Generalate, Christoph Grienberger, a professor of mathematics at the Collegio Romano, still attempted to press, behind the scenes, for greater openness. This is clear from Grienberger's effort to secure the publication of Biancani's *Sphaera Mundi*:

A new *cosmographia* seems to be necessary because the old one has been changed a great deal in our day and many embellishments have been added to it. But the question has been raised as to whether it is proper for us Jesuits to do this. It seems to me that the time has now come for a greater degree of freedom of thought to be given to both mathematicians and philosophers on this matter [constitution of heavens], for the liquidity and corruptibility of the heavens are not absolutely contrary to theology or to philosophy and even much less to mathematics. . . . It seems that he [Biancani] has not exercised his talents sufficiently in writing the *Cosmographia*. But I am quite willing to excuse him about this. For up to now his hands have been tied, as have ours. Thus he has dealt with most topics in a way which is not adequate when he was not allowed to think freely about what is required.³¹

Grienberger's effort ultimately failed. However, at this early stage the fear of novelty was to a certain degree indistinguishable from the fear that the reputation of the Society would be tarnished if a Jesuit espoused a strange (and erroneous) opinion. Thus, for example, even after Scheiner was permitted to publish his observations of sunspots, his superiors forbade him to do so under his own name, "lest he be mistaken and bring discredit on the Society." Even more striking was the caution exercised with the publication of the work of Gregory of St. Vincent. Having made important con-

tributions to mathematics during the 1610s and the 1620s (contributions that anticipated not a few of Cavalieri's results), Gregory requested permission to publish what he believed to be his most startling discovery: the squaring of the circle. General Vitelleschi referred the matter to Grienberger, who was not convinced. Even after the persistent Gregory was allowed to travel to Rome and work for two years with Grienberger, the latter desisted, judging that his confrère's effort "did contain the first steps of a solution to the problem" but that "for the moment the ideas were not sufficiently developed to lead to an acceptable result."³² Gregory did what many Jesuits did under such circumstances: bide his time. Ultimately, his monumental *Opus geometricum* was published, with Habsburg support, in 1647, after the deaths of Grienberger and Vitelleschi.

Matters worsened once prohibited opinions were codified for the first time in 1651. "I see that I will not be able to publish my study on colors," Orazio Grassi wrote in 1652, "because of the rigorous orders made. . . in these last General Congregations, in which ours are forbidden to teach many opinions, some of which are the substance of my treatise, and they claim to prohibit them not because they consider them bad and false, but because they are new and not ordinary. It will thus be necessary for me to sacrifice them to Holy Obedience, by which I will undoubtedly gain more than I would by publishing them."³³ Whereas Grassi had responded to the 1651 Ordinance by suppressing his treatise, Melchior Cornaeus adopted a more mischievous style in dealing with proscribed doctrines. True, in a 1653 letter to Athanasius Kircher, Cornaeus derided individual unskilled in mathematics who nonetheless presumed to judge on statics, threatening that "if I am not permitted to write what I think, then I will never write anything at all." Yet even though General Nickel denied his petition to print prohibited opinions, Cornaeus published his *Curriculum philosophiae Peripateticae* in 1657, wherein he spoke his mind on a large number of delicate topics by means of a "philosophical dissimulation." Discussing the issue of levity at some length, for example, Cornaeus ultimately denied the existence of positive levity; yet, in view of the explicit proscription against such a conclusion, the German author added this: "What I have just taught about gravity and levity according to the opinion of learned men, I myself have openly taught and held for many years. Now because the authority of my superiors commands something else, I say that it is probable that gravity and levity are two positive qualities . . .

and because authority commands that we subscribe to this opinion, I subscribe and I approve it."⁵⁴

The issue of Jesuit censorship, and the manner in which many would-be authors attempted to cope with it, has attracted considerable attention lately. Unfortunately, not enough attention has been given to an analogous issue: the general perception during the early modern period of the ambiguity with which controversial topics were often shrouded in Jesuit publications. Such ambiguity often exposed the Order to charges of dissimulation from critics who treated with indifference those who did not venture into print and with outright hostility those who published in a manner acceptable to the authorities. Instructive in this respect is the reaction to the 1672 publication of Pardies's *Discours de la Connoissance des Bestes*. "You have without doubt seen a little book by Father Pardies on the consciousness of animals," the Huguenot Esaié La Bourgeois wrote to Henry Oldenburg shortly after the book appeared. "In the first half of his book this Father puts Descartes' opinions in the best light in the world, and in such a way as to show that he accepts this opinion; and in the other half, where he speaks to refute it, you would say he only intends to jest. In the end you perceive that Father Pardies is speaking at the beginning and the Jesuit at the end."⁵⁵ Pierre Bayle, writing ten years later, concurred, depicting the book as a kind of "literary masquerade": "Everybody suspected Father Pardies to have wished to establish the opinion of M. Descartes adroitly, while pretending to refute him. Indeed, he answers well to his own objections, and those he leaves without response are so feeble, that it is not difficult to guess their meaning."⁵⁶ For his part, Father Daniel all but admitted that his confrère presented Descartes' arguments far more forcefully than he did their refutation, so that, effectively, he just about "convinced his readers." In fact, Daniel noted, the book "made the author pass among the Peripatetics for a prevaricator, who at the bottom was a Cartesian"—notwithstanding the pains he had taken in the second part of his book to refute Cartesianism and to "defend the ancient Philosophy, as to the souls of beasts." In his *Dictionary* Bayle reiterated the conclusion he had reached years earlier:

[Pardies's book] may be reckoned among those that have been published to maintain Des Cartes' opinion; for the reasons of the Cartesians are proposed in it, with their utmost strength, and very weakly refuted. I believe nevertheless that he was not negligent in the second part of his work, and that he did all that was possible

to maintain the ancient opinion; but having also done all that he could do to represent faithfully, and in their best colors, the reasons of the new; he has made some suspect, that he had no real design to confute Des Cartes.⁵⁷

It seems appropriate to cite contemporary estimations of Pardies's book at some length because they exemplify the inherent difficulty in inferring—then as now—the *precise* beliefs of Jesuit practitioners from their publications. Such difficulty arises not simply because the texts were obscure but because a fair judgment requires a "charitable" reading. Yet many early modern opponents of the Jesuits were averse to reading between the lines, instead welcoming the opportunity to castigate the veracity of the Jesuits on the basis of their vague (or contradictory) pronouncements. Nor that such critics were blind to the predicament of members of the Order. Indeed, the need for discretion among Jesuits was common knowledge. Christoph Grienberger put it neatly in a 1613 letter to Galileo: "I don't have the same freedom as you." Two years later, Piero Dini assured Galileo that he understood that "many Jesuits are secretly of the same opinion, although they keep quiet."⁵⁸

Galileo, though, was unwilling to empathize with the constraints facing Jesuit savants. Frustrated by their inability to publicly support him (or Copernicanism), he turned against the Order. Nor did other contemporaries prove more accepting of privately held novel theories, if they credited Jesuits with them at all. For example, when Christiaan Huygens informed Jean Chapelain in 1659 of the favorable reception of his Copernican theory of Saturn among Flemish Jesuits (he had Hessius and Tacquet in mind), his Parisian correspondent's response was as skeptical as it was damning: "I wonder that the good Fathers have become agreeable to the motion of the Earth and allow it to pass among you without opposition. But I fear that this tolerance is not general, and that for every one who will shut his eyes there are a hundred who open them wide, and find there grounds for excommunication." Several years later, having been informed of a similar open-mindedness, this time regarding two French Jesuits, Chapelain expressed little doubt but "that their mouths will be quickly stopped."⁵⁹

Such a dismissive attitude notwithstanding, it is important to recognize that most Jesuit savants coveted membership in the republic of letters and, having once attained it, were quite open and adventurous in their discussions despite the suspicions that such exchanges, especially with "heretics,"

could elicit. Thus, within a year of the beginning of his correspondence with Henry Oldenburg, Pardies was made to understand that his superiors looked askance at his relations with the English. His last surviving letter to the Secretary of the Royal Society makes sad reading. After requesting Oldenburg to stop sending him issues of the *Philosophical Transactions*, Pardies asked the Secretary to stop writing to him directly:

You would also please me by using the means of a friend when one is to be found rather than the post; as I am here a member of a religious community I cannot do everything I should wish and it is reasonable to respect the opinions of those who rule over us. Nevertheless I hope that I shall lose nothing from you and that when the opportunity of a friend serves you will do me the kindness to send me what you would have sent by other routes.⁵⁰

Discretion in communicating with non-Jesuit practitioners was not confined to Protestant contacts, as is evident from Baldigiani's instructions to Viviani—with whom he conspired to rehabilitate Galileo—regarding the handling of their correspondence:

I do not mind the delivery of the letters by means of the Fathers of the Mission, provided they content themselves with giving them personally to me and not in the presence of others, otherwise our superiors could greatly exaggerate and distort the matter [prendere ombre gagliarde]. If you do not want to go through the Fathers of the Mission, you can address the outside envelop [fare una sopraccarta] to the abbé Niccolò Baldigiani, who is my brother. Please do not communicate this paper of mine to anybody but Magalotti, whose opinion I would be very pleased to know for the time being, as well as yours, since I shall also consider you as my master. Furthermore, as this matter is so precious to me and to you, please have this paper delivered to me inclosing it in the first letter with which you will favor me.⁵¹

The participation of Jesuits in the republic of letters transcended personal and epistolary ties with non-members. Proud of their scientific (or literary) accomplishments, numerous Jesuit savants were determined to gain recognition by appearing in print, even if to do so required a certain amount of creative savvy: either they had to embed their results in vast compendia or they had to conceal their novelty. One such resolute member, already mentioned, was Gregory of St. Vincent. Another was Riccioli, who, as Dinis pointed out, "congratulated himself in his remarkable achievement" in managing to reconcile the Bible and the Church Fathers with recent astronomical observations. "We have saved the number of elements and of both the visible and invisible heavens," boasted Riccioli in the *Almagestum novum*, "without any superfluous orb, and with no disrespect for the work of God. We have saved the authority of the Bible, and of the Fathers and

Doctors, showing their substantial convergence. We have saved the common opinion of recent astronomers."⁵²

Riccioli's protégé Francesco Maria Grimaldi took equal pride in his remarkable optical discoveries. "I am not unaware," he wrote in the preface to *Physico-mathesis de Lumine* (1665), "that he might easily suffer the charge of arrogance, who boasts, that in a matter up to now so difficult, he is able to offer something certain and evident from his own findings, contrary to what leading philosophers have found up to date in their researches and subtle arguments." Yet, Grimaldi continued, audacity could not be imputed to such a careful experimenter and observer. Rather, his search for truth forced nature to unveil certain of its secrets, compelling other practitioners to revise long-established opinions. However, getting the work published called for extraordinary measures. The censorship of Grimaldi's magnum opus, as Baldini demonstrated, focused entirely on the first volume, and it is almost certain that the second was composed hastily in the last eight months of the author's life (March–December 1662)—after the censors submitted their judgment—so that the formal structure of the second volume, with its modified scientific content, would enhance the far more controversial first volume's chances for publication. The work's title page conveys the compromise: "Two books of Physico-mathematics on light, colors, the rainbow, and other related topics, the first of which adduces new experiments and reasons deducted from them in favor of the substantiality of light. In the second, however, the arguments adduced in the first book are refuted, and the Peripatetic teaching of the accidentality of light is upheld as probable." Such a strategy could easily elude charges of duplicity, though sympathetic readers, such as the reviewer for the *Philosophical Transactions*, managed to overlook this. The first volume, the reviewer noted, "contained the several Experiments, which may favor the Doctrine of the Substantiality of Light, together with the Ratiocinations thence arising. In the Second is represented, What may be answered to all those Arguments, so as to save the Peripatetick Opinion of the Accidentality of Light: Which yet is done in such a manner, as that the Author leaveth a liberty to the Judicious Reader, to embrace which of these two Opinions he shall think the more probable."⁵³

The conditions under which Jesuit publications saw light obliges us to give them the same charitable reading they were given by some contemporaries, notwithstanding the obligatory disparaging comments. As they were

well aware, not only did Jesuit compendia contain important observations and experiments (as well as philosophical insights); in addition, at a time when the boundaries and the contents of the respective scientific disciplines were still unsettled, few practitioners considered the unequivocal commitment to a "modern" world view to be a *sine qua non* for inclusion in the scientific community. The Copernican issue is a case in point. It is striking that the vilification of both Scheiner and Riccioli in the aftermath of the Galileo affair did not prevent either the *Rosa Ursina* or the *Almagestum Novum* from acquiring influential status among astronomers, in both Catholic and Protestant lands, despite their authors' non-Copernican cosmology. Indeed, it was possible to discuss much of the subject matter of astronomy without addressing cosmology at all. But when the need arose, Jesuit practitioners increasingly opted for careful presentation of the various world systems, invariably insinuating their preference by the way they declared their allegiance to geocentrism. André Tacquet, for example, stated in his *Opera mathematica* that he adhered to the immobility of the earth "solely for theological reasons and for fear to wander off the faith, because the other proofs thus far given lack demonstrative value." Along the way, he dismissed Riccioli's efforts to prove the immobility of the earth as a waste of time, and he all but invited the Copernicans to put forth an irrefutable mathematical demonstration of the heliocentric theory. John Collins, who reviewed the book for the *Philosophical Transactions*, was not alone in inferring the true meaning of Tacquet's message. Though the Jesuit "knows no Argument, demonstrating the *Rest of the Earth and Motion of the Sun*," Collins wrote, "yet the Authority of the Holy Writ, now seconded by that of the Sacred Congregation of the Cardinals, put it out of doubt."⁶⁴

Leibniz made use of the abundance of such pronouncements in Jesuit (and Catholic) writings in his efforts to induce the Catholic Church to lift its ban on Copernicanism. Dechaies, Leibniz wrote, "frankly confessed that one cannot hope for another hypothesis which satisfies the mind, and most distinguished astronomers have openly admitted that they are held back from presenting the Copernican system only by the fear of censure."⁶⁵ Hence, Leibniz noted, if "the truth of a hypothesis should be taken to be nothing but its greater intelligibility," then "there would be no more distinction between those who prefer the Copernican system as the hypothesis more in agreement with the intellect, and those who defend it as the truth." For if it is "permissible to present the Copernican system as the simpler

hypothesis, it would also be permissible to teach it as the truth in this particular sense." Thus, by maintaining the authority of the censors while enabling practitioners to teach, "we can finally restore philosophical freedom to those of ability, without damaging respect for the Church, and we will free Rome and Italy from the slander that great and beautiful truth are there suppressed, something that is known to be said and written widely among the English and the Dutch (not to mention the French)."⁶⁶

Leibniz's efforts came to naught, and the official Catholic position regarding Copernicanism remained unchanged. Yet, as Heilbron has observed, although "words that seemed sincere when written by Baliani, Riccioli, or Tacquet rang hollow half a century later . . . freed from the constraint that may now seem its rationale, the hedge about the truth was not unsound. In one guise or another, the view that mathematical theories have only an instrumental value has recurred in Western thought without the guidance of the Catholic Church."⁶⁷ I will not elaborate here on the instrumentalist stance adopted by Jesuit practitioners in their publications, but it is important to recognize that whatever daring was exercised in published books was surpassed by Jesuit practices in and out of the classroom. In view of the fact that so many Jesuits taught philosophy at some stage of their career, it is hardly surprising that numerous surviving lecture notes are quite dreary in their exposition of natural philosophy—indeed, many of these simply regurgitated, sometimes verbatim, lectures delivered by their own teachers or friends. Yet the mounting evidence regarding Jesuits who got away with introducing up-to-date material into their teaching, or (more likely) got into trouble because of it, suggests the need to reconsider the scientific teaching of the Jesuits.

Consider the teaching of atomism. It was a doctrine far more controversial than cosmology, yet, beginning at the turn of the seventeenth century, not a few Jesuits incorporated the subject into their lectures. The recollections of the atomist Sebastian Basso are instructive in this respect. Basso had studied at Pont-à-Mousson during the second half of the 1590s, and he was quite disparaging of the education he had received there. Yet he fondly recalled his philosophy teacher's warning not to take Aristotle as fairly representing the atomists: "I remember," Basso wrote, that "when he explained the views of Anaxagoras as given in Aristotle, our most learned preceptor Petrus Sinsonius, the outstanding professor of philosophy at the Academy of Pont-à-Mousson, said, ridiculing the faith in Aristotle: 'I believe that

Aristotle robbed these Ancients of their arms so that he could defeat them more easily unarmed." At Louvain around 1630, it was Willem Hesius who, "even before Descartes had done so . . . had abandoned all external qualities and distinct modes, admitted by some foolish Peripatetics as a necessary evil in dealing with generation and corruption, and instead made use of streams of particles emanating from the brain and the sun, the movements of which he lucidly explained."⁶⁸

If philosophy teachers appear to have been initially undisturbed in their exposition of atomist ideas, by 1632 matters had changed radically, possibly as a consequence of the publication in that year of Roderigo Arriaga's *Cursus philosophicus*. "Pragam videre Arriagam audire" ran a seventeenth-century slogan, attesting to the popularity of Arriaga, a professor of philosophy and theology at Prague whose *Cursus* was approved for publication in 1630 or 1631. As was the case with Pardies three decades later, contemporaries were perplexed when it came to correlating the daring of Arriaga's philosophical ideas with his proclaimed adherence to Aristotelianism and Catholic dogma. Pierre Bayle, who admitted that Arriaga "seem[ed] to have succeeded much better in confuting what he denied, than in defending what he affirmed," nonetheless dismissed the charges that "thereby he became a Follower of *Pyrrhonism*." Rather, Bayle insisted, Arriaga's repeated protestations "that he was no *Pyrrhonist*" should be taken at face value:

It would certainly be the highest injustice to suspect him of the least Prevarication, or of betraying the *Dogmatists*; for, if, on one hand, he exerted all his Strength in confuting a great number of Opinions; he employed it on the other, in supporting the Opinions, which he had embraced: It was easy to see, that he acted with Sincerity, and exerted himself to the utmost; and, if his Proofs are weaker than his Objections, the blame must be laid on the nature of the Things. . . . He gave up most of the received Opinions of the Schools in Points of Natural Philosophy, such as the Composition of the *Continuum*, Rarefaction, etc. and therefore undertook to defend the Innovators in Philosophy. It is pity so refined and penetrating a Genius had not had a better Notion of right Principles; for he might have carried them very far.⁶⁹

Whether permission for its publication was granted because the *Cursus* was dedicated to Emperor Ferdinand II or because (as Arriaga argued later) such ideas were accepted in Prague, the spectacle of a renowned Jesuit maintaining atomism in public prompted the proscription of such ideas in Rome on August 1, 1632. Six months later, General Vitelleschi formulated his

strong opposition to mathematical atomism in a letter he dispatched to Ignace Cappon in Dole: "As regards the opinion on quantity made up of indivisibles, I have already written to the Provinces many times that it is in no way approved by me and up to now I have allowed nobody to propose it or defend it. If it has ever been explained or defended, it was done without my knowledge. Rather, I demonstrated clearly to Cardinal Giovanni de Lugo himself that I did not wish our members to treat or disseminate that opinion." However, the routine reissuing of such injunctions in subsequent years and the unflagging efforts of the censors to expunge such a doctrine from Jesuit books attest to the continued dissemination of atomism within the Order.⁷⁰ Indeed, in 1649 the teaching of the "Zenonist doctrine" by an unnamed German professor who claimed to have followed Arriaga, coupled with the far more embarrassing public exposition of such ideas by Sforza Pallavicino in the Collegio Romano, provoked General Carafa to issue yet another injunction, which in turn precipitated the codification of a list of prohibited opinions two years later.⁷¹ Not even that measure was sufficient to bridle Jesuit professors, as the case of Father Giuseppe Ricci makes clear. Ricci—Vico's teacher at Naples in 1683—is singled out in Vico's autobiography as "a man of penetrating insight, a Scotist by sect but at bottom a Zenonist." Ricci continued to expound his atomist ideas until 1687 when the Roman authorities issued a list of seven propositions that he was forbidden to teach. Ricci's superiors immediately removed him from teaching philosophy, and for the next 13 years he was assigned to teach cases of conscience.⁷²

The measures taken against audacious Jesuits were not simply a manifestation of a conservative rejection of new ideas *per se*. Rather, they were often motivated by the determination to preserve the philosophical edifice upon which Catholic dogma rested and prevent the corruption of impressionistic youth. Hence, regardless of how compelling any alternative philosophical system might become, it could not be allowed to dominate the philosophy course. Tellingly, the 1651 Ordination culminated decade-long complaints from various provinces protesting not only the ominous spread of pernicious doctrines but also the professors' willful subverting the order of teaching, their wasting time in "endless disputes about useless questions," their failing to cover the required material, and their taking excessive liberty in mixing philosophy and theology. The Revisors further fueled the crisis by remonstrating that "Aristotle and Thomas had been laughed

out of the Order."⁷³ It is against this background that we should read the 1646 admonition of Leone Santi, Prefect of Studies at the Collegio Romano:

Scholastic theology signifies none other than that which supposes Aristotelian philosophy. If, therefore, our authors commonly depart from Aristotle, they are transmuting not non-scholastic theology, but, as some would say, fantastic theology, for each individual forges his own with great confusion and perturbation to the Church. But how much less can someone defend and explain the theology of Saint Thomas in his theological conclusions . . . if in his philosophy he departs from the principles of Aristotle and the entire Peripatetic school? For unless minds are contained within certain limits their excursions into exotic and new doctrines will then be infinite, as will their ways of talking, with constant danger lest we should be brought before the Holy Tribunal of the Inquisition.⁷⁴

The problem was hardly unique to the Jesuits. On both sides of the confessional divide we find theologians in consternation over the rupture of the philosophical basis of theology caused by the new science. In his famous 1642 letter to Father Dinet, Descartes himself enumerated the reasons for the opposition his philosophy encountered among Dutch Calvinists:

The professors reject this new philosophy for three reasons. First, it is opposed to the traditional philosophy which universities throughout the world have hitherto taught on the best advice, and it undermines its foundations. Second, it turns away the young from this sound and traditional philosophy and prevents them reaching the heights of erudition; for once they have begun to rely on the new philosophy and its supposed solutions, they are unable to understand the technical terms which are commonly used in the books of traditional authors and in the lectures and debates of their professors. And, lastly, various false and absurd opinions either follow from the new philosophy or can be rashly deduced by the young—opinions which are in conflict with other disciplines and faculties and above all with orthodox theology.⁷⁵

But whereas the perceived need to preserve scholastic philosophy quickly abated among Protestants during the second half of the seventeenth century, it remained acute among Catholics. Indeed, as late as the middle of the eighteenth century we find Carlo Benvenuti, a protégé of Roger Joseph Boscovich, stirring up a storm at the Collegio Romano precisely for such reasons. Having expounded a truly modernist natural philosophy in two successive public disputations, the young Jesuit aggravated matters by immediately publishing the theses. Alessandro Centurione, the Superior of Italy—who would become General the following year—charged Benvenuti with disobedience and demanded his removal from the College. Significantly, however, Centurione was not particularly troubled by Benvenuti's substitution of Newtonian explanations for those of Aristotle or Descartes.

Rather, he complained that the *Synopsis physicae generalis* published by the young Jesuit had effectively turned natural philosophy into a mathematical and experimental science and "omitted almost entirely the traditional topics of physical ontology, pneumatology, and natural theology"—topics central to the educational objectives of the Society, which sought to unify physics, metaphysics, and theology. Benvenuti was banished from Rome, but Boscovich mobilized Pope Benedict XIV on his behalf. The outcome was described by the pope: "The flame of dissension which had erupted between the Fathers of the Collegio Romano and their General" (who, "being uniquely attached to the peripatetic philosophy, did not approve any of the theses held and defended in the Roman College, and applauded by those Fathers who were aware of the sound but modern philosophy") had died down. The theses were allowed to stand, and at the pope's demand Benvenuti was appointed professor of Sacred Liturgy at the Collegio Romano—a chair Benedict had founded a few years earlier.⁷⁶

Removal of audacious Jesuits from teaching philosophy, as stipulated in the founding documents of the Society, became a popular measure against those charged with introducing novel ideas into the classroom. Cristoforo Borri, as I noted earlier, was removed from his teaching position in Milan in 1614 after senior members of the College complained to Acquaviva about his expounding, among other novel ideas, the doctrine of the fluidity of the heavens. Three decades later it was the superiors of the Lyons Collège who protested Honoré Fabri's controversial teachings. Fabri, a correspondent told Mersenne, was "at odds with the Fathers of his Society. And it is believed that they did all they could to make him leave, just as they did all they could to stop the printing of his works." Fabri was relieved of his teaching duties and sent to Rome as Penitentiary to St. Peter's. His one-time student Pardies found that his colleagues and superiors at La Rochelle, and then in Bordeaux (where he taught between 1666–1670), were equally resentful of his predilection to "pursue strange opinions avidly," and consequently Pardies ultimately found himself promoted to a professorship of mathematics at Clermont. For his part, Grimaldi was said to have been transferred from the chair of philosophy to that of mathematics for health reasons, yet it is quite likely that his radical ideas on the nature of light contributed to the decision.⁷⁷ Many others were made to reconsider their religious vocations by being appointed to teach theology or to engage in edifying writing—as was the lot of Giulio Cesare Cordata, a professor of

philosophy at Macerata who was "removed from the chair for his inclination for innovation and called to Rome to finish the History of the Society."⁷⁶

The handling of spirited Jesuits is better illustrated by the efforts made in the early eighteenth century to subdue Jesuit followers of Malebranche. Yves-Marie André was the most outspoken among them. His friendship with the Oratorian and his active role in disseminating Malebranche's philosophy resulted in his rustication at La Flèche in 1705. There André joined Fathers Rodolphe du Tertre and Joseph-Michel Aubert and proceeded to convert other young Jesuits such as François de La pillonnière, who ultimately left the Society and turned Calvinist. The concerned superiors began their crackdown by removing Aubert from teaching philosophy and later sending him to teach mathematics in Caen. Du Tertre's disciplining was more severe: he was banished to Compiègne to teach rhetoric. Mortified, and claiming to have received no advanced warning, the Jesuit concluded that he had been made an example to intimidate others. Within a year, du Tertre began to reconsider his philosophical and religious positions, and in 1715 his retraction of previous beliefs was made public in his poignant *Réfutation d'un nouveau système de métaphysique*. André reacted bitterly to his confrère's about-face, even composing a "*burlesque métamorphose*" that derided the manner in which du Tertre, upon being demoted to teach a lower class, disowned his philosophy and all his convictions—"he went to bed Malebranchist and woke up the next morning a peripatetic." André himself was initially allowed to resume teaching philosophy, but he appears to have strained the patience of his superiors everywhere he turned, with the result that he was repeatedly disciplined and even incarcerated in the Bastille for a while.⁷⁹

Ultimately, however, formal teaching mattered less than instruction outside the classroom, since interest in advanced scientific and philosophical ideas had always been the domain of a relatively small number of individuals who could be introduced to new ideas far more easily (and profitably) in private. The *Ratio* already acknowledged the importance of extracurricular instruction in the mathematical sciences. Inspired by Clavius, its authors allowed that "if there are some . . . who are fitted and inclined toward these studies, let them be practiced in them in private lessons after the end of the course." That was precisely what the professors did, sometimes on a large scale. For example, soon after he was appointed professor

in the Collegio Romano, Baldigiani told Viviani that he could hardly spare an hour for his own studies as he tutored more than a hundred students—many of whom were members of the upper class—and expected to turn at least twelve of them into skilled geometers. These students did not include members of the Order, whom Baldigiani also trained.⁸⁰

There is no mistaking the indispensability of private instruction to the formation of scientific interests among Jesuit and non-Jesuit students alike. One need only recall the contribution of the school of Clavius in Rome, or that of Gregory of St. Vincent in Flanders, to the formation of many seventeenth-century luminaries. Elsewhere, other committed Jesuits filled similar functions. I have already mentioned the influence of Biancani on Riccioli in Parma, and that of Ceva on Saccheri in Milan; I will now add Christoph Scheiner's private studies with Johann Lantz in Ingolstadt and Scheiner's own training of Johann Baptist Cysat after Scheiner became a professor of mathematics at Ingolstadt.⁸¹ The non-Jesuit savants included Nicolas Fabri de Peiresc, who was "in a special manner inflamed with the study of Mathematics" while at Tournon during the late 1590s. The astronomical observations carried on by the Jesuit fathers there, as well as in Avignon, undoubtedly helped inspire Peiresc's initiative in later years to coordinate global collaborative observations.⁸² Similarly, Evangelista Torricelli, while studying mathematics and philosophy at Faenza in 1625 and 1626, exhibited such talent and aptitude that "his uncle was persuaded to send him to Rome for further education at the school run by Benedetto Castelli." Two decades later, Gian Domenico Cassini discovered mathematics and astronomy while a student at the Jesuit College in Genoa; he subsequently embarked on a study of astronomy under the guidance of Riccioli and Grimaldi in Bologna.⁸³ Late in life, Buffon recalled how his interest in mathematics had been ignited while he was at school in Dijon in the years 1717–1723. He "had studied mathematics at an early age with intensity," he recalled, always carrying a copy of Euclid in his pocket. Subsequently, under the tutelage of the professor of mathematics Jean-Baptist Péricaudet, Buffon was introduced to higher mathematics. Unlike Buffon, whose passion for mathematics stood in inverse proportion to his loathing of the literary aspects of the curriculum, Jérôme de Lalande excelled in both. After discovering astronomy at age 12 in 1744, when a comet appeared, Lalande proceeded to study mathematics and astronomy under Joseph-Laurent Bérard (also the mentor of Jean Étienne Montucla

and Charles Bossut). He composed his first astronomical work while still at the Collège. In 1748 he assisted Béraud in observing a solar eclipse.⁸⁴

Equally important, at any given moment most Jesuit colleges were likely to be inhabited by talented mathematicians and natural philosophers who did not officially teach these subjects but who were willing and able to privately enhance the studies of young members. One example should suffice. Pierre Daniel Huet studied at Caen during the mid 1640s and was introduced to mathematics by the professor of philosophy Pierre Mambrun, who took immediate notice of the youth and "resolved to bestow peculiar pains in forming" him outside the normal course. Huet, however, became enamored with mathematics and "spent days and nights" in the study of geometry, much to Mambrun's chagrin. Mambrun feared that such premature excessive preoccupation would hamper Huet's philosophical studies. But once Huet had completed the required course, Mambrun goaded him to resume his mathematical studies. Not being a mathematician himself, Mambrun approached Erade Bille, a professor of moral philosophy who "possessed consummate knowledge in the abstruse sciences, which was concealed under a veil of singular modesty," to assume the role of Huet's "moderator and guide." Two other philomaths then in the Collège—George Fournier (who taught mathematics at La Flèche, Dieppe, and Hesdin between 1628 and 1644) and another professor of philosophy, Pierre Gautruche—were equally enthusiastic in lending a hand to advance the mathematical knowledge of the talented and eager Huet.⁸⁵

This example testifies to the need to cast a truly wide net in evaluating the caliber of Jesuit practitioners, especially those who did not publish. Luigi Confalonieri is a case in point. Educated at the Collegio Romano, he subsequently taught the triennial course of logic, natural philosophy, and metaphysics there before being sent in 1638 to teach theology and moral philosophy in Milan. Confalonieri shunned publication, and were one to rely solely on the account of him that Castelli sent to Galileo in 1637 one probably would form a rather low opinion of this Jesuit. Castelli—whose animosity toward the Jesuits was heightened after Galileo's condemnation—described a prank played on Confalonieri by his students, who solicited his opinion on an experiment pertaining to the relations between light and heat whose results they had skewed. Confalonieri allegedly produced an explanation that conformed to traditional Aristotelian philosophy and persisted in defending his original interpretation—even after the deception had been

revealed—by contesting the validity of the experiment. Castelli concluded, with evident glee, that "the intellect and the brain of this philosopher find it easier and more ready to assent to false conclusions than to true ones: and then show how easily the mind is reduced to philosophize about falsehood rather than truth."⁸⁶ Yet the chance survival of the correspondence between Confalonieri and Giovanni Battista Baliani, which commenced shortly after the Jesuit's arrival in Milan, gives Confalonieri a depth absent from the caricature drawn by Castelli. Far from being a slavish follower of the Stagirite, Confalonieri emerges as both averse to Aristotelianism and receptive to new ideas. Indeed, he appears to have been one of the earliest readers of Descartes in Italy⁸⁷ and an adherent of atomism. Yet Confalonieri did not covet martyrdom, and in 1639 he freely admitted that he was not free to teach in public what he believed. "Confalonieri was probably an example of that doctrinal doubleness of which many Jesuits were accused," Constantini concluded:

... while in their public function as teachers they leaned towards the compulsory uniformity of doctrine, which was sternly imposed in the Order during the 1640s, and with understandable repugnance put on the garments of the 'solemn peripatetic,' in a more personal and modest sphere of activity they joined many others ... who, though within the limitations of recent condemnations pronounced by the Church, worked for a progressive dismantling of the assumptions of the traditional culture.⁸⁸

We know more about Confalonieri's younger French contemporary, Jean Bertet. This talented Jesuit is generally mentioned, if at all, in order to charge him with inadvertently bringing about the placement of Descartes on the index of prohibited books by transmitting to Fabri the correspondence between Descartes and Mesland. However, not only is there no evidence to implicate Fabri himself in the 1663 action by the Congregation of the Index; Bertet would certainly not have been involved in such a plot. He entered the Society in 1637, at age 15. After completing his studies and then teaching humanities for eight years, he spent most of the 1650s teaching philosophy and practicing astronomy. He communicated his observations of the 1652 comet to Cassendi, whom he admired and in whose honor he composed *Soteria pro Petro Gassendo, huius aetatis philosophorum principe, Recens è Peripneumonia recreato* in 1654. By the end of the 1650s, though, Bertet had shifted his loyalty to Descartes. In 1659, having recently been appointed professor of mathematics at Aix, Bertet initiated a correspondence with Clerselier, informing the editor of Descartes's

correspondence that thanks to his (Clerselier) efforts, young members of the Order—including Bertet himself—were beginning to become devotees of Cartesian philosophy. He abandoned Gassendi's physics, the Jesuit informed Clerselier, on the ground that it did not "penetrate to the very origin of things." It is quite possible, in fact, that Bertet was sent to teach mathematics in Aix after being removed, on account of his Cartesian views, from teaching philosophy at Grenoble.

Bertet wanted to do more than simply disseminate Descartes's philosophy among his confreres. Like Mesland in the previous decade, he was intent to rehabilitate Descartes's orthodoxy as well, and to this end he asked Clerselier's opinion on a small treatise he (Bertet) had composed on the philosophy of the Eucharist based on Cartesian principles.³⁹ In the aftermath of the proscription of Descartes's books, Clerselier allowed himself to be convinced that the Jesuits were to blame, and the correspondence with Bertet was terminated. But the latter remained an unwavering advocate of Descartes, and when in 1671 the University of Paris launched a campaign against Descartes, Bertet wrote wryly to John Collins: "There is a great rumor in the University of Paris concerning Cartesius's doctrine, which they would condemn as being contrary to the mystery of the Eucharist; but our faith may be explicated according to the principles of every philosophy." Bertet was also a convinced Copernican, and in 1665 he told Constantyn Huygens that the orbit of the then visible comet confirmed him in this belief. In 1689, no longer a Jesuit, Bertet could be found in Rome, conspiring with Leibniz and Baldigiani to get the ban on Copernicanism lifted.⁴⁰

Both Confalonieri and Bertet were fully cognizant of the disciplinary measures taken by the Jesuit authorities to ensure conformity. It may seem surprising that, notwithstanding such measures (which must have been applied to hundreds of Jesuit philosophers and mathematicians in the course of the early modern period), only a few Jesuits left or were expelled from the Society as a consequence of such measures. In part, this is a testimony to the gravity with which Jesuit practitioners took their vows. But it is also clear that for most members—who never doubted the primacy of the religious mission of the Society even when they differed on the extent of the dangers that the new philosophies posed to the traditional relations between philosophy and theology—the constraints were a burden to be contended with from within the Order. Many continued to preach the benefit of at

least a modicum of philosophical freedom, even in print. Honoré Fabri was among them, and in his *Euphyandrus* he made the following point:

In the field of politics it is characteristic of human society to have and maintain trust in another; in the field of literature however, it is not like that: for though authority may be of great weight, if it lacks entirely the support of reason, I do not see that Euphyander should assent and surrender himself to it. Hence he should not swear by the words of the master unless truth is the master; nor should he by the same token be bound to the Thomists or the Scotists; let all his friends be lovers of truth. . . . let Euphyander maintain freedom of thought, let him enslave himself to no party lest he be forced to serve error, let him remain always in that state which he may freely judge about the truth of a subject that is proposed, in brief let him surrender to reason and its demonstration alone.⁴¹

A younger contemporary of Fabri, Anroine Rochon, who got into trouble for espousing Cartesian philosophy, concluded his public retraction in a similar vein: "Allow me," he pleaded, "the liberty to choose that which will please me of Mr. Descartes, and in this manner I shall be able to well accommodate his philosophy to mine. For just as formerly God permitted the Hebrews to marry their captives, after they have purified and had washed from them the last traces of infidelity, so, after having scrubbed and purified the philosophy of M. Descartes, I might indeed be able to embrace his opinions. It is the opinion of Saint Jerome who made use of this example to show that Christians can accommodate the works of pagan Philosophers."⁴²

Others practitioners complained in private of their (or the Society's) lot. "While I was in the Collegio Romano," Daniel Bartoli wrote Lana Terzi in 1677, "I wished to set up an academy dedicated to experiments, and to studies related to them, but I was unable, and realised that if one began to open one's eyes to modern things, there would be no market for the nonsense which we teach and the students would abandon the Master. We deserve the harm which we suffer. As regards the metaphysical nonsense, we do not teach natural philosophy nor do we know a thing about it. The explanation for this is that there are masters who impart errors through maliciousness rather than ignorance."⁴³ Nearly 100 years later, Boscovich still decried the myopia of those in power, who could scarcely differentiate between the new natural philosophy and heresy. "Believe me," he wrote to his brother in 1760, "I turn cold at the thought of having to return [to the Collegio Romano], I have lost all my love for that house though you should know that there are many people there who have been good to me. Those who are good don't count and the studies of those who count will come to

nothing. There, if you are not a Peripatetic you are a heretic. . . . If you say that a material thing is active or is capable of moving it means to give admittance to disbelievers and approach materialism. I preach that the most harm done to Religion is to try to tie it to physical things."⁹⁴

Many a Jesuit savant, like Boscovich, remained in the Order and, wearing the professor's gown, taught, experimented, and wrote at one of the several hundred colleges operated by the Society. And while these savants vehemently denied that the philosophy and science they taught (or wished to teach) was conducive to heresy, it became a truism long before the dissolution of the Order that the literary diet at Jesuit colleges was enough to usher in full-blown secularism—especially when compared with the dogmatism inculcated in Jansenist schools. "There was no humanistic nonsense in the Jansenist schools," one historian put it. "So they did not breed free-thinkers or even deists, but only nonentities. Instead of producing Voltaire and Diderot they nurtured the trained gadflies who fed on these great men."⁹⁵ This brings us back to the educative mission of the Order. Long ago Samuel Johnson remarked that "not to name the school or the masters of men illustrious for literature, is a kind of historical fraud, by which honest fame is injuriously diminished."⁹⁶ We are still far from being fully conscious of the enormous contribution of Jesuit teachers to the formation of Catholic secular culture during the early modern period. That the Jesuit fathers cared for more than 200,000 children and adolescents each year is staggering in itself. But we may also recall that the Jesuits produced Torricelli, Descartes, Mersenne, Fontenelle, Laplace, Voltaire, Diderot, Helvétius, Condorcet, Turgot, Voltaire, Vico, and Muratori, to name but a few non-Jesuits. I will conclude by applying the insight of Father Porée—a renowned teacher of rhetoric at the Collège Louis-le-Grand—to the scientific and philosophical domains. When Porée, who entertained some literary pretensions, was told that his former student Voltaire had cited him as "not one of the great poets," the Jesuit promptly retorted: "At least [Voltaire] may grant that I have been able to make some of them."⁹⁷

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Notes

1. George Sarton, "Vindication of Father Hell," *Isis* 35 (1944): 97–105. Hell's observations were in fact published in Copenhagen in 1770.
2. Hell's older contemporary Boscovich encountered similar prejudices, notably from D'Alembert. See e.g. Luigi Pepe, "Boscovich and the Mathematical History of His Time. An Unpublished Letter by d'Alembert," in R. J. Boscovich, ed. P. Bursill-Hall (Rome, 1993).
3. Anthony Grafton, "The Soul's Entrepreneurs," *New York Review of Books*, March 3, 1994, p. 33.
4. *The Correspondence of Isaac Newton*, ed. H. Turnbull et al. (Cambridge, 1959–1977), volume 1, p. 135. For the uncommon demands that Newton's terse and often obscure paper made on its readers, by virtue of its overturning "so many received ideas and introduced so many new concepts" as well as being deliberately belligerent, see Alan F. Shapiro, "The Gradual Acceptance of Newton's Theory of Light and Color, 1672–1727," *Perspectives on Science* 4 (1996), p. 66.
5. Paolo Rossi, "The Scientist," in *Baroque Personae*, ed. R. Villari (Chicago, 1995), pp. 285–286.
6. Richard F. Lirtledale and Ethelred L. Taunton, "Jesuits," *Encyclopaedia Britannica* (Cambridge and New York, 1911), volume XV, pp. 341–342.
7. Helvétius, *A Treatise on Man* (London 1777; reprint: New York, 1969), volume 1, pp. 76–77.
8. Gerard Manley Hopkins, *Selected Letters*, ed. C. Phillips (Oxford, 1990), pp. 163–165.
9. Steven J. Harris, "Introduction," *Early Science and Medicine* 1 (1996), p. 284.
10. Isabelle Pantin, "Is Clavius Worth Reappraising? The Impact of a Jesuit Mathematical Teacher on the Eve of the Astronomical Revolution," *Studies in History and Philosophy of Science* 27 (1996): 593–598.
11. See the essay by Baldini in this volume.
12. Michael John Gorman, *The Scientific Counter-Revolution: Mathematics, Natural Philosophy and Experimentalism in Jesuit Culture, 1580–c. 1670*, Ph.D. thesis, European University Institute, Florence, 1998, p. 18; John W. O'Malley, *The First Jesuits* (Cambridge, Mass., 1993), p. 214.
13. Aldo Scaglione, *The Liberal Arts and the Jesuit College System* (Amsterdam and Philadelphia, 1986), p. 5; Steven J. Harris, "Transposing the Merton Thesis: Apostolic Spirituality and the Establishment of the Jesuit Scientific Tradition," *Science in Context* 3 (1989), p. 31 and n. 4. See also Harris, "Confession-Building, Long-Distance Networks, and the Organization of Jesuit Science," *Early Science and Medicine* 1 (1996): 287–318.
14. Scaglione, *The Liberal Arts and the Jesuit College System*, p. 52; Paul Richard Blum, "Apostolato Dei Collegi: On the Integration of Humanism in the Educational Programme of the Jesuits," *History of Universities* 5 (1985), p. 109.
15. Pietro Redondi, *Galileo Heretic* (Princeton, 1987), p. 289.

16. Scaglione, *The Liberal Arts and the Jesuit College System*, p. 66. The Constitutions "wish to leave nothing to chance or improvisation, and one wonders whether such an aptitude to prescribe, formalize, and institutionalize, down to the most minute details could really be implemented."
17. Denis Diderot, ed., *Encyclopédie, au dictionnaire raisonné des sciences, des arts et des métiers, par une société de gens de lettres* (Paris, 1751–1765), volume VIII, p. 513a. Diderot may have derived such an image from Étienne Pasquier's ferociously anti-Jesuit *Catéchisme des jésuites* (1593). Pasquier vehemently denounced there the "hermaphroditic" character of "this monster which, being neither Secular nor Regular, was both things together, thereby introducing into our Church a Hermaphrodite Order" (cited in Jean Lacouture, *Jesuits*, Washington, 1995, p. 348).
18. William Law, *A Serious Call to a Devout and Holy Life*, ed. P. Stanwood (New York, 1978), pp. 250–251.
19. Henry Harrisse, *L'abbé Prevost; histoire de sa vie et des oeuvres d'après des documents nouveaux* (Paris, 1896; reprint: New York, 1972), p. 15. For a partial translation, see John McManners, *Church and Society in Eighteenth-Century France* (Oxford, 1998), volume I, p. 607.
20. *The Correspondence of Henry Oldenburg*, ed. A. Hall and M. Hall (Madison and London, 1965–86), volume VIII, p. 144.
21. Ivana Gambaro, *Astronomia e Tecnica di Ricerca nelle Lettere di G. B. Riccioli ad A. Kircher* (Genoa, 1989), p. 79. See the essay by Dinis in this volume.
22. Riccioli, *Almagestum novum* (Bologna, 1651), volume I, p. xvii; Riccioli, *Astronomiae reformatae tomi duo* (Bologna, 1665), p. xii, cited in Alfredo de Oliviera Dinis, *The Cosmology of Giovanni Battista Riccioli*, Ph.D. thesis, Cambridge University, 1989, p. 20.
23. O'Malley, *The First Jesuits*, p. 212.
24. The Constitutions explicitly discouraged recruiting older "men of letters who are both good and learned" because "of the great labors and the great abnegation of oneself which are required in the Society." The Society followed another path: "Our procedure will be to admit young men who because of their good habits of life and ability give hope that they will become both virtuous and learned in order to labor in the vineyard of Christ." (*The Constitutions of the Society of Jesus*, St. Louis, 1970, pp. 172–173)
25. *Memoirs of the Life of Peter Daniel Huet, Bishop of Avranches: Written by Himself* (London, 1810), volume I, pp. 238–241; Luigi Tenca, "Relazioni fra Girolamo Saccheri e il suo Allievo Guido Grandi," *Studia Ghisleriana* 1 (1952), p. 23, cited in Linda Allegri, *The Mathematical Works of Girolamo Saccheri*, S. J. (1667–1733), Ph.D. thesis, Columbia University, 1960, p. 29.
26. Menard, *Histoire civile, ecclésiastique, et littéraire de Nismes* (1755), volume VI, pp. 516–517. I owe this reference to Alice Stroup.
27. Paul Shore, "Universalism, Rationalism, and Nationalism among the Jesuits of Bohemia, 1770–1800," in *Progrès et violence au XVIIIe siècle*, ed. V. Cossy and D. Dawson (Paris, 2001), p. 77; McManners, *Church and Society in Eighteenth-Century France*, volume I, pp. 508–509.
28. *Le Opere di Galileo Galilei*, ed. A. Favaro (Florence, 1890–1909), volume XIII, p. 71; Enrico Giusti, *Bontaventura Cavalieri and the Theory of Indivisibles* (Bologna, 1980), pp. 5–11.
29. Antonio Favaro, "Due Lettere inedite del P. Girolamo Saccheri . . . a Vincenzo Viviani," *Rivista di Fisica e Scienze Naturali* 4 (1903), pp. 426, 430–431; Linda Allegri, *The Mathematical Works of Girolamo Saccheri*, S. J. (1667–1733), Ph.D. thesis, Columbia University, 1960, pp. 45–51.
30. Karl A. F. Fischer, "Jesuiten-Mathematiker in der Französischen und Italienischen Assistenz bis 1762 bzw. 1773," *Archivum Historicum Societatis Iesu* 52 (1983), pp. 61, 57; Alice Stroup, "Le Comté Venaissin (1696) of Jean Bonfà, S. J.: A Paradoxical Map by an Accidental Cartographer," *Imago Mundi* 47 (1995): 118–137, esp. pp. 122, 129, 136–137.
31. Ludwik Grzebień, "Kochanski and the Jesuits," *Organon* 14 (1978): 51–59.
32. August Ziggelaar, *François de Aguilón S. J. (1567–1617) Scientist and Architect* (Rome, 1983), p. 35.
33. Archives de l'Observatoire, Paris, B. 4. 10. I am grateful to Alice Stroup for this reference.
34. Peter, *Lord King, The Life and Letters of John Locke* (reprint: New York and London, 1984), p. 85.
35. Salmerón himself consented to publish only under pressure from the General, and only after he was provided with assistants.
36. William V. Bangert, *Claude Jay and Alfonso Salmerón: Two Early Jesuits* (Chicago, 1985), pp. 329, 335; O'Malley, *The Early Jesuits*, pp. 114–115; Constitutions of the Society of Jesus, p. 284.
37. Joseph H. Fichter, *Man of Spain: A Biography of Francis Suarez* (New York, 1940), p. 157.
38. C. W. T. Blackwell, "The Case of Honoré Fabri and the Historiography of Sixteenth and Seventeenth Century Jesuit Aristotelianism in Protestant History of Philosophy: Sturm, Morhof and Brucker," *Nouvelles de la République des Lettres* 1 (1995): 49–77, on p. 65; Catherine M. Northeast, *The Parisian Jesuits and the Enlightenment 1700–1762* (Oxford, 1991), p. 3; Harris, "Transporting the Merton Thesis," p. 40.
39. H. Bosmans, "André Tacquet (S.J.) et son Traité d'Arithmétique Théorique et Pratique," *Isis* 9 (1927), p. 72.
40. Cited in Maurizio Torrini, *Dopo Galileo: Una Polemica Scientifica (1684–1711)* (Florence, 1979), p. 88.
41. *Oeuvres Complètes de Christiaan Huygens* (The Hague, 1888–1950), p. 347; Fischer, "Jesuiten-Mathematiker," pp. 61, 62.
42. Mark Morford, *Stoics and Neostoics: Rubens and the Circle of Lipsius* (Princeton, 1991), pp. 119–120; Anthony Grafton, *Joseph Scaliger: A Study in the History of Classical Scholarship* (Oxford, 1983–1993), volume II, p. 700.
43. [Seth Ward], *Vindiciae Academicarum* (Oxford, 1654), p. 20; Dinis, *Cosmology of Giovanni Battista Riccioli*, p. 193.

44. *Philosophical Transactions* 9 (1674–75), p. 233.
45. *St. Ignatius and the Ratio Studiorum*, ed. E. Fitzpatrick (New York and London, 1953), p. 126.
46. *Monumenta Paedagogica Societatis Iesu*, volume II, p. 667, cited in Rivka Feldhay, *Galileo and the Church* (Cambridge and New York, 1995), p. 137; Camille de Rochemonteix, *Un Collège de jésuites aux 17^e et 18^e siècles: Le Collège d'Henry IV à la Flèche* (Le Mans, 1899), volume IV, p. 12, cited in Roger Ariew, *Descartes and the Last Scholastics* (Ithaca, 1999), p. 17.
47. *Ratio studiorum et Institutiones Scholasticae Societatis Iesu*, ed. G. Pachtler (Berlin, 1890), volume 3, pp. 12–20.
48. Ugo Baldini, *Legem Impone Subactis: Studi su Filosofia e Scienza dei Gesuiti in Italia 1540–1632* (Rome, 1992), p. 242, n. 1.
49. *Monumenta Paedagogica Societatis Iesu*, volume IV, p. 745, cited in Feldhay, *Galileo and the Church*, pp. 142–143.
50. Michel-Pierre Lerner, "L'entrée de Tycho Brahe chez les jésuites ou le chant du cygne de Clavius," in *Les Jésuites à la Renaissance*, ed. L. Giard (Paris, 1995), p. 157; Joseph Brucker, *La Compagnie de Jésus*, second edition (Paris, 1919), p. 494.
51. Baldini, *Legem Impone Subactis*, pp. 235–236, tr. in Richard J. Blackwell, *Galileo, Bellarmine, and the Bible* (Notre Dame, 1991), p. 152 (translation slightly modified).
52. William R. Shea, *Galileo's Intellectual Revolution* (London, 1972), p. 49; Herman Van Looy, "A Chronology and Historical Analysis of the Mathematical Manuscripts of Gregorius a Sancto Vincentio," *Historia Mathematica* 11 (1984): 57–75, on p. 58. See also Paul P. Bockstaele, "Four Letters from Gregorius A. S. Vincentio to Christopher Grienberger," *Janus* 56 (1970): 191–202.
53. Claudio Constantini, *Baliani e I Gesuiti* (Florence, 1969), p. 108, cited on pp. 181–182 of Gorman, "The Scientific Counter-Revolution."
54. Marcus Hellyer, "Because the Authority of My Superiors Commands: Censorship, Physics and the German Jesuits," *Early Science and Medicine* 1 (1996): 319–354, on p. 345. See also Paul Richard Blum, "Science and Scholasticism in Melchior Cornaeus SJ," in *Proceedings of the 6th International Congress of Neo Latin Studies*, ed. S. Revard et al. (Binghamton, 1988), p. 576.
55. *Correspondence of Henry Oldenburg*, volume IX, p. 72.
56. Bayle, *Nouvelles de la République des Lettres* (1684), cited in Leonora C. Rosenfield, *From Beast-Machine to Man-Machine: Animal Soul in French Letters from Descartes to La Mettrie* (New York, 1941), p. 219, n. 24.
57. *The Dictionary Historical and Critical of Mr. Peter Bayle*, second edition, rev. Pierre Des Maizeaux (London, 1735 reprint: New York, 1984), volume IV, p. 902, note C. In 1726 an author in the *Mémoires des Trévoux* explained that "although [Pardies] swallowed Cartesian science to the extent to which it was generally accepted, he put up as strong a defense of the Peripatetic view of animal soul as possible."
58. *Opere di Galileo Galilei*, volume XI, p. 480; vol XII, p. 181.
59. *Oeuvres Complètes de Christiaan Huygens*, volume II, p. 529; *Lettres de Jean Chapelain, de l'Académie française*, ed. P. Tamizey de Larroque (Paris, 1880–1883), volume II, p. 67.
60. With marked heaviness, Pardies added that he would have accompanied the Duc de Béthune to Calais had there been an opportunity for him to travel "a little farther and coming to see you." He continued: "I confess to you that I should take great satisfaction in having the benefit of seeing you and so many of the famous people who make up your Royal Society." (*Correspondence of Henry Oldenburg*, volume IX, pp. 134–135)
61. Antonio Favaro, "Miscellanea Galileiana inedita," *Memorie del Reale Istituto Veneto di Scienze Lettere ed Arti* 22 (1882), p. 838, tr. in Domenico Bertoloni Meli, "Leibniz on the Censorship of the Copernican System," *Studia Leibnitiana* 20 (1988), p. 35, n. 81.
62. Dinis, *Cosmology of Giovanni Battista Riccioli*, p. 113.
63. Francis A. Mc Grath, Grimaldi's Fluid Theory of Light, MSC thesis, University of London, 1969; Baldini, *Legem Impone Subactis*, pp. 101–103 and p. 118, n. 130; *Philosophical Transactions* 6 (1671), p. 3068.
64. Bosmans, "André Tacquet," p. 74; *Philosophical Transactions* 3 (1668), p. 870. For a fuller discussion of Tacquet, see Vanpaemel's essay in this volume.
65. A reviewer of Dechales's *Cursus* pointed out that the author "explodes the Fear of a Vacuum" in his section on statics, and that when treating magnetism he "intimates . . . that if the Authority of the H. Scriptures did not hinder, the Consideration of the Verrure of the Magnet would add much of Probability to the Copernican System." (*Philosophical Transactions* 9, 1674, p. 230)
66. *Leibniz, Philosophical Essays*, ed. R. Ariew and D. Garber (Indianapolis, 1989), pp. 2–93.
67. John L. Heilbron, *The Sun in the Church: Cathedrals as Solar Observatories* (Cambridge, Mass., 1999), p. 206.
68. *Philosophia naturalis adversus Aristotelem libri XII* (1621), p. 13, cited in C. H. Lüthy, "Thoughts and Circumstances of Sébastien Basson, Analysis, Micro-History, Questions," *Early Science and Medicine* 2 (1997), pp. 36–37; O. Van de Vyver, "L'école de mathématiques des jésuites de la province flamande-belge au XVII^e siècle," *Archivum Historicum Societatis Iesu* 46 (1980), p. 269 (translation from Vanpaemel's essay in this volume).
69. *The Dictionary Historical and Critical of Mr. Peter Bayle*, volume I, pp. 506–507; K. Eschweiler, "Roderigo de Arriaga, S. J. Ein Beitrag zur Geschichte der Barockscholastik," *Spanische Forschungen* 3 (1931): 253–285.
70. Constantini, *Baliani e I Gesuiti*, pp. 59–60; Michael John Gorman, "A Matter of Faith? Christoph Scheiner, Jesuit censorship and the Trial of Galileo," *Perspectives on Science* 4 (1996), p. 297.
71. *Ratio studiorum et Institutiones Scholasticae Societatis Iesu*, ed. Pachtler, volume III, p. 75.
72. *The Autobiography of Giambattista Vico* (Ithaca, 1990), pp. 114; Romano Gatto, *Tra Scienza e immaginazione. Le matematiche presso il collegio gesuitico*

- napoletano (1552–1670 ca.) (Florence, 1994), p. 264 and n. 640; P. Rossi, "I punti di Zenone: una preistoria vichiana," volume XIII (1998), pp. 377–426.
73. Brucker, *Compagnie de Jésus*, p. 769; Blum, "Science and Scholasticism in Melchior Cornaeus," pp. 573–580; Hellyer, "Because the Authority of My Superiors Commands," p. 328.
74. Gorman, "Scientific Counter-Revolution," p. 177.
75. *The Philosophical Writings of Descartes*, ed. J. Cottingham et al. (Cambridge, 1984–91), volume II, p. 393, n. 1.
76. Ugo Baldini, "Teoria Boscovichiana, Newtonismo, Eliocentrismo: Dibattiti nel Collegio Romano e nella Congregazione dell'Indice a metà Settecento," in *Saggi sulla Cultura della Compagnia di Gesù (secoli XVI–XVIII)* (Padua, 2000); *Le Lettere di Benedetto XIV al Card. de Tencin, 1735–1758*, ed. E. Morelli (Rome, 1965), volume III, p. 169.
77. Domingo M. Gomes dos Santos, "Vicissitudes da obra do P. Cristóvão Borri," *Anais da Academia Portuguesa de História*, second series, 3 (1951), p. 143; *Correspondance du P. Marin Mersenne Religieux Minimie*, ed. P. Tannery et al. (Paris, 1945–1988), volume XV, p. 245; DSB; Vasco Ronchi, "Padre Grimaldi e il suo tempo," *Physica* 5 (1963): 368–369.
78. Germano Paoli, "Boscovich and Enlightenment," in *Bicentennial Commemoration of R. G. Boscovich*, ed. M. Bossi and P. Tucci (Milan, 1988), p. 230.
79. Camille de Rochemonteix, *Un Collège de Jésuites aux 17^e et 18^e siècles: Le Collège d'Henry IV à la Flèche* (Le Mans, 1889), pp. 82–106.
80. St. Ignatius and the *Ratio Studiorum*, ed. Fitzpatrick, p. 130; Favaro, "Miscellanea Galileiana inedita," pp. 849–850. Among the Jesuits, Baldigiani singled out Pantaleo Balbi, who performed well during a public examination in the presence of the General but who could not devote himself entirely to mathematics since he was still a student of philosophy.
81. Steven J. Harris, "Les Chaires de mathématiques," in *Les Jésuites à la Renaissance*, ed. Giard, pp. 251–252.
82. Pierre Gassendi, *The Mirror of True Nobility and Gentility. Being the Life of the Renowned Nicholas Claudius Febricius Lord of Peiresc* (London, 1657), pp. 13–14. According to Pierre Humbert (*Les Astronomes Français de 1610 à 1667*, Draguignan, 1942, p. 61), Peiresc's passion was aroused through the teaching of Pierre Royer, who later served as Professor of Mathematics at Avignon just at the time when Peiresc began carrying out his telescopic observations at Aix. Fischer, "Jesuiten-Mathematiker," p. 57.
83. DSB s.v. Torricelli; Cassini.
84. "Hérault de Séchelles' visit to Buffon (1785)," in *From Natural History to the History of Nature*, ed. J. Lyon and P. Sloane (Notre Dame and London, 1981), pp. 364, 382; Hélène Monod-Cassidy, "Un astronome-philosophe, Jérôme de Lalande," *Studies on Voltaire and Eighteenth-Century Studies* 56 (1967), p. 907.
85. *Memoirs of the Life of Peter Daniel Huet*, volume I, pp. 23–29.
86. Galileo, *Opere*, volume XVII, pp. 121–123.
87. Confalonieri discussed the *Discours* with Antonio Santini, who was instrumental in the diffusion of the book in Italy, and with Baliani.
88. *Baliani e i Gesuiti*, pp. 19–69, 111–133, quote on pp. 21–22, cited in W. E. Knowles Middleton, "Science at Rome, 1675–1700, and the Accademia Fisico-mathematica of Giovanni Giustino Ciampini," *British Journal for the History of Science* 8 (1975), p. 150.
89. The treatise was "Traité de la présence réelle, de la transubstantiation, du sacrifice de la Messe, où toutes les disputes sur ce sujet sont recueillies, avec une concordie de tous les anciens Pères avec les controversistes modernes."
90. Paul Lemaire, *Le Cartésianisme chez les Bénédictins: Dom Robert Desgabets* (Paris, 1901), pp. 105–111; Fischer, "Jesuiten-Mathematiker," pp. 57, 61; Humbert, *Astronomes Français*, pp. 22–23; *Oeuvres Complètes de Christiaan Huygens*, p. 327; S. P. Rigaud, *Correspondence of Scientific Men of the Seventeenth Century* (Oxford, 1841), vol. I, p. 157; Meli, "Leibniz on the Censorship of the Copernican System," p. 33.
91. Honoré Fabri, *Euphyandrus* (Lyon, 1669), pp. 61–62, cited in Blackwell, "The Case of Honoré Fabri," p. 57.
92. Lettre d'un philosophe à un Cartésien. See Pierre-Antoine Fabre, "Dépouilles d'Égypt: L'expurgation des Auteurs Latins dans le Collège jésuite," in *Les Jésuites à la Renaissance*, ed. Giard, pp. 55–76.
93. Michael John Gorman, "Jesuit Explorations of the Torricellian Space: Carpal Bladders and Sulphurous Fumes," *Mélanges de l'Ecole Française de Rome* 106 (1994), pp. 7–8.
94. Germano Paoli, "Boscovich and Enlightenment," in *Proceedings of the Bicentennial Commemoration of R. G. Boscovich*, ed. M. Bossi and P. Tucci (Milan, 1988), pp. 232–233.
95. Theodore Besterman, *Voltaire* (Chicago, 1976), p. 34.
96. Samuel Johnson, *Lives of the English Poets*, ed. G. Birkbeck Hill (Oxford, 1905), volume II, p. 81.
97. Cited in Thomas Hughes, *Loyola and the Educational System of the Jesuits* (New York, 1982), p. 133.