

## The Institutionalisation of Scientific Thinking in the Tuscany of the Last Medici

It has become customary in general accounts of the Grand Duchy of Tuscany during the first three decades or so of the eighteenth century, which correspond to the last years of the long Medici dynasty, to speak a little disparagingly—and even with a touch of irony—of its institutional culture, portraying its chief representatives as being either absorbed in the self-complacent protocol of the court or else intent on dispensing ultimately insignificant erudition at the podium, where only rarely is the audience treated to a flash or two of actual brilliance. To the extent such general statements are acceptable without being universally binding, this is perhaps a sufficiently reasonable, if definitely uncharitable, appraisal of the situation. Certainly if we attempt to define its parameters geographically, we soon enough come across men like Giambattista Vico in the Vice-kingdom of Naples, Antonio Conti and Antonio Vallisnieri in the Republic of Venice, and Ludovico Antonio Muratori in the Duchy of Modena, and the comparison cannot possibly be favourable to the Tuscan literati. If we instead approach the question historically within the Grand Duchy itself, we immediately encounter the luminaries of the Accademia del Cimento (1657–1667), namely Giovanni Alfonso Borelli, Francesco Redi and Vincenzo Viviani, all of whom were dead by 1703, and we are forced to admit that their successors' contribution to world knowledge was not of an overwhelming magnitude. It would seem indeed, as Cochrane put it, that at the beginning of the eighteenth century Tuscan science went into temporary hibernation.<sup>1</sup>

There is a sense, however, in which the customary appraisal of the early Tuscan *Settecento* is not acceptable, and it concerns the possible consideration of its scholarly society as a more or less intelligent group of cultural consumers and transmitters—working within the limits of the academic establishments—rather than rival producers

of a body of doctrines hopelessly incomparable to the ones inherited from the Cimento. It is the purpose of this paper to discuss the institutional order of Tuscan culture at this time, paying particular attention to the manner in which it received and used the teachings handed down as the Cimento legacy, and to appraise at the same time the efficacy of its creative institutionalisation of the principal thought-forms of that tradition in other fields of knowledge. Reception or *receptio*, as it is technically known by its Latin name, is a composite idea which includes the appropriation, utilisation and application of principles derived from a source of acknowledged epistemological validity and intellectual superiority as well as institutional legitimacy, and it is a historiographic category that can enable us to understand the natural end point of a historical process—such as the dissolution of an academy or the death of a productive man of genius—as the actual beginning of a new tradition, in which the achievements of the past, frequently attained through the heroic and prolonged efforts of the country's best minds, now figure as the basic conceptual apparatus of freshmen and inexperienced novices working in a variety of areas.<sup>2</sup>

It follows from all of this that in tracing the institutional reception of the philosophical attitude and general mode of thinking of the Accademia del Cimento, especially as it survived its dissolution in the work of Francesco Redi, who had been one of its leading members and who—by reason of his closeness to Cosimo III—enjoyed for several decades a position of great power in the academic establishments of the Grand Duchy,<sup>3</sup> it is necessary to look for signs of its presence also in fields generally regarded as conceptually and methodologically distant from experimental science. The underlying assumption here is that the similarity among the arts and sciences in an institutionally cohesive setting—such as that of the Grand Duchy—is not accidental, and that research carried out by the same men simultaneously in several fields is bound to be conditioned by the models basic to the one field that enjoys institutional prominence over the others, which is itself an official recognition of its primacy as gauged in terms of relative financial support from the authorities. It is an assumption that privileges the general mode of thinking of an age, with the proviso that this must always be properly interpreted to take into account its dependence on the institutional life of a given culture

within an area and a period of political and ideological homogeneity.

This means, for instance, that where the chief field of activity, sanctioned by the government and favoured by a flourishing profession, is jurisprudence, as it clearly is in early eighteenth century Naples, then research in other areas of the curriculum is bound to bear the trademark of this discipline, as is in fact exemplified by the aesthetics of Gianvincenzo Gravina, whose conceptual and explanatory categories in the theory of poetry are actually derived from the systematic exposition of Roman law.<sup>4</sup> Where, on the other hand, the dominant field is, or has been till very recently, what may be loosely called experimental science, then the thought-forms and explanatory techniques as well as the standards of professional rigour of the local scientific tradition are very likely to condition the character, and to orientate the procedures, of most efforts at progress in adjacent fields. My claim is that this is precisely what happened in the Grand Duchy of Tuscany during the last years of Medici rule.

That this should be so may come as a surprise to those who are accustomed to consider the history of science in isolation from other fields of study, for in the Grand Duchy of the last Medici there were no societies devoted to the examination of purely scientific problems, except, perhaps, the society of the physiocrats of Siena, which was altogether insignificant on account of its locally restricted scope. Indeed this was true of Italy as a whole, which throughout the first half of the eighteenth century could not claim any scientific academies to carry on the work of the great societies of the previous century, notably the *Investiganti* in Naples, the *Lincei* in Rome and the *Cimento* in Florence. None of these, it may seem, had left any legacy worthy of discussion to the eighteenth century, nor indeed to the last decades of the seventeenth. Middleton, correctly and with a touch of elegance, refers to the *Accademia del Cimento* after its dissolution in 1667 as the "dead academy," permanently in the past and now alive only in the nostalgic dreams of its secretary Lorenzo Magalotti.<sup>5</sup>

It would be, however, a serious error in method to isolate the strictly scientific work of men like Francesco Redi and his disciples, contextualising it only in the history of science and showing indifference to its points of contact with other areas of inquiry, on the assumption that the evolution of science proceeds in accordance with

its own internal laws of development. For what we call science, in the Grand Duchy of the seventeenth and eighteenth centuries, had neither the conceptual nor the institutional autonomy of later times. In this context it is worth recalling that the motto of the Accademia del Cimento, "provando e riprovando," is a quotation from Dante's *Divine Comedy*,<sup>6</sup> and that while completing his studies on vipers and human parasites as well as on spontaneous generation, Francesco Redi was, among other things, a highly esteemed professor of Tuscan poetry at the University of Florence. On the frontispieces of his scientific works he proudly identified himself as a member of the Accademia della Crusca, which had been constituted principally to promote the study and status of the Tuscan language, and he literally filled his laboratory reports with quotations from Dante and from other ancient Italian, Latin and Greek poets. Later, his disciple Lorenzo Bellini presented his studies on anatomy as a series of lectures before the same academy, while his and Vincenzo Viviani's other disciple and friend Anton Maria Salvini, discussed earthquakes, the tobacco leaf and humoral psychology before the Accademia degli Apatisti, which was especially devoted, as was Salvini himself, to the cultivation of eloquence and poetry.<sup>7</sup> This was more or less the situation in all of Tuscany until the last years of Giangastone, the last Medici Grand Duke, who in 1733 finally authorised a series of radical reforms in the University of Pisa.<sup>8</sup> The knowledge pursued by the scholars of Redi's and of the following generation was thought to possess encyclopaedic unity and to require institutional cohesiveness. Redi, recalled his earliest biographer and younger contemporary Salvino Salvini, who was then president of the University of Florence, was regarded as being skilled in "universal letteratura,"<sup>9</sup> which distinction (we may add) his real and his ideal disciples now strove in his wake to attain for themselves within the institutional framework of the Grand Duchy, concentrating in one or two areas without ever neglecting the others. In all such cases, science is not an autonomous activity but only one aspect—formally separable from the others without being practically so—of what the scholars of the time simply called *scientia*, unified in theory and largely uncompartimentalised in practice.

It is at the level of the thought-forms proper to such encyclopaedic *scientia* that the institutional reception of Francesco Redi and the Accademia del Cimento is more clearly visible in the eighteenth century.

The most important teaching that he and his fellow academicians imparted to the scholars of the following generation was a lesson in scientifically rigorous thinking, which then meant empirically based inferential thinking with self-evident guarantees of validity, the kind of thinking alluded to in the academy's Dantesque motto "provando e riprovando." While the exact meaning that this quotation had for each member of the academy may be difficult to determine, there is no ambivalence in the perception that Francesco Redi had of it and later transmitted to his students and readers. In the opening line of his *Osservazioni intorno alle vipere* (1664), his paraphrase of the famous motto as "iterata e reiterata esperienza" leaves no doubt that for Redi repeated experimentation, or the collection and analysis of various sets of data, constitutes a modern scientist's claim to methodological superiority.<sup>10</sup> That empirical observation was the way of scientific progress had been—in the common perception—the legacy of Galileo, but that all single experiments should be treated with scepticism unless sufficiently repeated to allow a reliable comparative study of the data was Redi's special contribution to the development of rigour and to the concept of method in the Tuscany of his period. The reception of this thought-form in eighteenth-century *scientia* was efficacious, in so far as the methodological principle that it represented was accepted as a criterion of scientific and scholarly competence, and active, in so far as it was not simply taken as an established truth incapable of further elaboration but regarded as a principle of creative reflection.

Its most important—but certainly not its only—fruit was the creation of the science of textual philology, the first principles of which were slowly and systematically formulated in Tuscany by the scholars of the post-Redi generation, all working within the official institutional framework of Tuscan culture. Prior to this time in Tuscany, and even at this time elsewhere in Italy, the works of ancient authors were published in the text of famous past editions, on the assumption that the acceptance of the authority of tradition was preferable to the arrogance of its self-proclaimed correctors. The first step in the right direction, analogous to the natural philosopher's privileging of direct observation in opposition to traditional accounts, was the utilisation of a manuscript rather than an older printed source as the basis of the new edition. The second step, due indirectly to the philosophical

anti-authoritarianism and working scepticism inspired by all of the Cimento and directly to Redi's teaching, was the recognition of the need to unearth as many manuscripts of a work as possible, to develop reliable techniques for their collation, and hence to establish rigorous criteria for the identification and emendation of the errors transmitted by the editorial tradition. The chief contributors to the development of this new science—in which the mode of thinking that calls for the collection and collation of the manuscripts is the same as that which in the biological sciences calls for repeated experimentation and comparative analysis of the data—were: Anton Maria Salvini, senior professor of Greek at the University of Florence and Cosimo III's permanent auditor in the Accademia degli Apatisti; Anton Maria Biscioni, a custodian of the Grand Duchy's magnificent Laurentian library and an archivist of the first calibre; Rosso Antonio Martini, sometime secretary of the Accademia della Crusca; Giovanni Gaetano Bottari, chief compiler of its official dictionary; and Salvino Salvini, permanent rector of the University of Florence and president of the Accademia Fiorentina.<sup>11</sup>

It is no accident, therefore, that textual philology, whose first principles have been variously credited to later foreign scholars as a result of the general unfamiliarity with the state of Tuscan scholarship in the early eighteenth century, developed and flourished here rather than in any other active cultural centre in Italy. For its founders and principal contributors, all real or ideal disciples of Francesco Redi, had at their disposal all of the institutional machinery of the Grand Duchy for the dissemination of new modes of thinking and standards of excellence. In the year 1700, two years after the death of Francesco Redi and thirty-two after the dissolution of the Cimento, the collective membership of the Florentine academies was not greater than 150, and this figure included most professionals and amateurs with an active interest in cultural matters. But by the middle of the century that figure would quadruple, keeping pace with the increasing level of advanced literacy, to a very large extent the result of institutional proselytising and training.<sup>12</sup> For the academies at once provided institutional backing to aspiring scholars and trained them in institutional solidarity and epistemological orthodoxy.

Given this state of affairs, however, actual scientific ideas and theories, rather than the thought-forms that rendered them possi-

ble, could be propagated—whether or not they had been sanctioned by Redi and the other Cimento academicians—only if they passed through a tightly screened control mechanism, designed to ensure quality as well as to rule out dissidence. The institutional order of Tuscan culture at that time was not even formally independent of the State. The schools and academies of which it is comprised are in fact hierarchical structures that stem from the broad base of their general membership or student body, rise through their elected or appointed officers, and finally culminate in the Grand Duke himself, who thereby had access to and control of his collective *intelligenza* through the formal structures of what were in effect undisguised state corporations.<sup>13</sup> Consequently the Tuscan academicians of this period display a degree of cultural and ideological homogeneity that would be unthinkable beyond the chronological and geographical boundaries of Cosimo III's domain, which is marked by inflexible intolerance of insubordination and heterodoxy in any form. Elsewhere in Italy the co-existence of mutually subversive intellectual currents, into which the internal tension of healthy cultural growth is dialectically resolved, contrasts very heavily with the peculiarly uniform appearance of the Tuscan scholarly world. And although they certainly did not encourage dissidence, Cosimo's predecessors and successors were by comparison permissive in their attitude to cultural pluralism. Here it is sufficient to recall that the University of Pisa—and by implication all other academic institutions, all of whom were in the shadow of its great prestige—enjoyed academic freedom prior to and after but not during Cosimo's reign. In 1691 Cosimo, under the influence of the Jesuits and of friars from various orders, went as far as to legislate the inerrancy of Aristotle and the falsity of all divergent systems of thought, decreeing that only Aristotelian philosophy could be expounded by Tuscan university professors and explicitly forbidding any public or private discussion of atomism, in a concerted effort to subdue the lure of materialistic heresies and to curb the diffusion of theologically erroneous doctrines.<sup>14</sup>

In such a discouraging climate, which could potentially cause the stagnation of several branches of science into an exclusively Aristotelian examination of texts and ideas, it occasions little wonder that the institutional reception of the *Accademia del Cimento* and of Francesco Redi did not openly stress their epistemology of di-

rect experimentation in science, and frequently blurred out of focus their polemical attitude toward the scientific stances favoured by the church. One must read not only the book of nature but also those in the library, Anton Maria Salvini had wisely taught a class of junior academicians, in an effort to check possible overconfidence in empiricism and growing disregard for the magisterium of tradition.<sup>15</sup> And in another lecture before an assembly of the Apatisti, whose president had challenged Salvini to determine which science was more obliged to the eighteenth century, he diplomatically replied that no single science had been privileged over the others and that they all flourished in the Grand Duchy.<sup>16</sup> But in discussing the principal achievements of the Tuscan men of his and of the previous generations, he carefully avoided mentioning the controversial aspects of their work, preferring to pass in silence Galileo's defence of the heliocentric system, Redi's ridicule of Aristotelianism and of the principle of philosophical authority as well as of the would-be scientific attitude of the distinguished Jesuit Athanasius Kircher, and he chose not to mention Redi's sympathy for the explanatory power of atomism. Nor was any of these aspects of Redi mentioned by Giuseppe Maria Bianchini who, in 1714, in a dissertation on the hypocrisy of men of letters, indicated him as model of intellectual distinction. And none, of course, had been alluded to in the three medals that Cosimo III had issued in honour of Redi in 1688, which Bianchini recalled as examples of enticing rewards for scholarly achievement combined with institutional loyalty.<sup>17</sup>

Now all of this abundantly proves that in a tightly controlled institutional system passive reception, which may range from the silent acceptance of an idea to its use as a datum in arguments that are not designed to raise questions of wide scope and great magnitude, always accompanies active reception, in virtue of which whatever is received is regarded as an enabling condition in the continuing and unrestrained pursuit of knowledge, and may therefore be said to be a living force in the evolution of ideas. Redi and the Cimento tradition, however much admired by the two generations of scholars that followed them in the long reign of Cosimo III, were necessarily received through both forms, in accordance with the Tuscan official policy on academic freedom. Of course, passivity with respect to potentially subversive ideas of irrefutable validity may quite simply



mean calculated adherence to an official policy for fear of reprisals—and here it is worth recalling that the Italian translation of Lucretius by the Galilean physicist Alessandro Marchetti was categorically denied permission to go to press in Tuscany, despite the translator's solemn declarations of philosophical orthodoxy, and that when an edition was attempted in Naples by a publisher with professional contacts in the Grand Duchy, it was quickly thwarted by the authorities. The Italian Lucretius had finally to be issued in London by Paolo Rolli almost a half a century after it was translated. But more often than not, such passivity is very probably a sign of ideological complicity with the policy-setting authority, resulting as it does from the system's efficacy in training its members in institutional loyalty as they rise through the ranks—and here it should be sufficient to observe that, by means of careful patronage and through the lieutenancy of ideologically trustworthy persons at the top of the Grand Duchy's cultural hierarchies, Cosimo had been able to secure public denunciations of atomism and eloquent justifications of state policies from some of the most undisputed luminaries of the academic world.

Such then was the institutional reception of the Accademia del Cimento and Francesco Redi, after the dissolution of the former and the death of the latter. The passive component is definitely there, calling for criticism from the historian of cultural institutions. But the active or creative one shows more than the occasional flash of brilliance and stands as a tribute to a generation of scholars who—in a very unheroic age and under very unfavourable conditions—did their best to promote the dissemination of knowledge, and to pass on the kind of thinking that in better times leads to intellectual progress.

*University of Toronto*

#### NOTES

- 1 Eric Cochrane, *Florence in the Forgotten Centuries* (Chicago: The University of Chicago Press, 1973), p. 255.
- 2 Y. Congar, "La réception comme réalité ecclésiologique," *Revue des sciences philosophiques et théologiques* 56 (1972), pp. 369–403.
- 3 On this point see Domenico Pietropaolo, "Literary Taste at the Court of the Last Medici," in *The Spirit of the Court*, ed. G. S. Burgess and R. A. Taylor (Cambridge: Brewer, 1985), pp. 264–272.

- 4 For a full discussion, see Domenico Pietropaolo's, "La definizione della poesia nella *Ragion poetica* del Gravina," *Quaderni d'italianistica* VI (1985), pp. 52-63.
- 5 W. E. Knowles Middleton, *The Experimenters: A Study of the Accademia del Cimento* (Baltimore: Johns Hopkins Press, 1971), p. 326.
- 6 *Paradiso* III, 3.
- 7 Anton Maria Salvini, *Discorsi accademici* (Venezia: Pasinelli, 1735), I, pp. 4, 103, 118; II, p. 152.
- 8 See Domenico Pietropaolo, "Dante's Concept of Nobility and the Eighteenth-Century Tuscan Aristocracy: An Unknown Study of the *Convivio*," *Man and Nature* V (1986), pp. 145-147.
- 9 In Francesco Redi, *Opere* (Milano: Classici italiani, 1809), I, p. xxvii.
- 10 In Francesco Redi, *Scritti di botanica, zoologia e medicina*, ed. P. Polito (Milano: Longanesi, 1975), p. 43.
- 11 For a full discussion see Domenico Pietropaolo, "Anton Maria Biscioni's Textual Criticism of the *Convivio* and the *Vita Nuova*," *Studies in Medievalism* II (1983), pp. 213-216; "The *editio princeps* of Boccaccio's Commentary on the *Divine Comedy*," *Quaderni d'italianistica* VII (1986), pp. 153-164.
- 12 Statistics based on Eric Cochrane, *Tradition and Enlightenment in the Tuscan Academies: 1690-1800* (Chicago: The University of Chicago Press, 1961), pp. 37-38.
- 13 Cf. Michele Maylender, *Storia della accademie d'Italia* (Bologna: Cappelli, 1926-1930), III, p. 4.
- 14 Niccolò Rodolico, *Stato e chiesa in Toscana durante la reggenza lorenese: 1737-1765* (Firenze: Le Monnier, 1910; rpt., 1972), p. 3.
- 15 *Prose toscane* (Venezia: Pasinelli, 1734), p. 464.
- 16 *Discorsi accademici*, III, pp. 29-30.
- 17 *Della satira italiana con una dissertazione dell'ipocrisia degli uomini letterati* (Roveredo: Marchesoni, 1759), p. 81.