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Science as a Calling? The Early Modern Dilemma

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Argument

Notwithstanding the preponderance of clerics among early modern scientific practitioners, only scant attention has been paid to the ramifications of their "calling" on their ability to engage freely in scientific studies. Indeed, the overall failure to calibrate the compatibility between full-fledged secular studies and a clerical vocation has led to misconceptions concerning the nature of the participation of ordained men in early modern science. It is not simply that ministerial duties imposed considerable demands on their time and energy; more significantly, the essence of this vocation was such as to impinge fundamentally on their ability to dedicate themselves to science or, most important of all, on their willingness to acknowledge publicly their contribution. A focus on the inner tensions that plagued practitioners in holy orders during the sixteenth and seventeenth centuries will both highlight the insurmountable challenges posed by the specialized and secularized nature of the "new science" on clerics – irrespective of denomination – and explain their eventual marginalization in the scientific endeavor.

Sometime in the late 1630s, the mathematician John Pell was invited for dinner by John Williams – Bishop of Lincoln and a man known for his interest in science – "for the freer discourse of all sorts of literature and experiments." Impressed by Pell's performance that evening, Williams offered him a benefice, which the mathematician promptly refused. Being no divine, Pell explained, "and having made the mathematics his main studie," he did not consider himself suitable for a church preferment – at which point the Bishop, undoubtedly realizing the soundness of Pell's reasoning, lamented the overall lack of patronage in the sciences:

> Alasse! what a sad case it is that in this great and opulent kingdome there is no publick encouragement for the excelling in any profession but that of law and divinity. Were I in place, as once I was, I would never give over praying and pressing his majesty till a noble stock and fund might be raised for so fundamentall, universally usefull, and eminent a science as Mathematicks. (Aubrey 1898, 2:129–30)

The anecdote bears directly upon the two most fundamental aspects of early modern English science, namely the role of patronage and the relations between science and religion. However, a host of other issues are hinted at, including the

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hierarchy of the various disciplines in the overall framework of knowledge and the role of universities as sites for the transmission and advancement of scientific knowledge; the contemporary career patterns and the socio-political and economic pressures brought to bear upon the various participants in the scientific enterprise; the early attempts to bring about the institutionalization and professionalization of scientific activity; and perhaps, most important, the combined effect of all these issues on the process of secularization. What immediately strikes us, in fact, is the virtual impossibility of discussing one issue in isolation from the others. Unfortunately, constraints of space permit me to explore only three features of the religious and institutional context that impinged on scientific practice: the contribution of the institutional structure of higher learning to curbing the sustained and concentrated scientific activity of its members; the role of secular learning in early modern learned culture – especially contemporary perceptions of its relative importance vis-à-vis theology; and the pressures exerted by the institutional, professional, and increasingly secular nature of the new science on the ability of clerics to remain creative and active participants in the scientific endeavor.

To discuss "secularization" and "professionalization" of science before the nineteenth century is, by general consensus, to flirt with anachronism. Nevertheless, I believe that there occurred during the sixteenth and seventeenth centuries a conscious and conspicuous effort on the part of scientific practitioners to achieve some measure of autonomous and legitimate status for the study of nature, most notably in the mathematical and physical sciences. While the effort proved only partly successful – especially if judged by modern criteria – it ought to be accorded particular significance in view of its momentous consequences for the relations between science and religion and because even a circumscribed autonomy was without precedent. To illustrate the ensuing tension, I shall approach the issue from a rather neglected point of view: that of clerical practitioners. Given the preponderance of clergymen among early modern scientific practitioners, curiously little attention has been paid to the ramifications of their "calling" on their ability to engage freely in scientific studies. Indeed, the overall failure to calibrate the compatibility between full-fledged secular studies and a clerical vocation has led to misconceptions concerning the nature of the participation of ordained men in early modern science. Nor was it simply that ministerial duties made considerable demands on their time and energy. Rather, the nature of their vocation was such as to impinge fundamentally on their ability to dedicate themselves to science or, in cases when they did, on their willingness to acknowledge their contributions publicly. For this reason, my focus on the inner tensions that plagued practitioners in holy orders during the sixteenth and seventeenth centuries is intended to highlight the challenges posed by the specialized and secularized nature of the "new science" for clerics – irrespective of denomination – and explain their eventual marginalization in the scientific endeavor.

The centrality of the concept of "calling," both general and particular, for English Calvinists of all shades, is well established. For our purpose here, the "particular"

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calling is the relevant one, "wherewith God enableth us, and directeth us, and putteth us on to some *special* course and *condition of life*, wherein to employ our selves, and to exercise the *gifts* he hath bestowed upon us" (Sanderson 1689, 205; emphasis in original). Though all callings were regarded noble, since all were blessed by God, the ministry was universally singled out as the most weighty and extraordinary. As Robert Sanderson put it in 1621, "every man should have an *inward Calling* from God, for his particular course of life; and this in the *Calling of the Ministry* is by so much more requisite, than in most other *Callings*, by how much the business of it is more weighty than theirs, as of things more immediately belonging unto God" (ibid., 220; emphasis in original). High Churchmen may have been perhaps more willing than most Puritans to accept that the possession of great intellectual gifts was a sign of having been chosen by God – the "godly," in contrast, placed the utmost emphasis, even exclusivity, on an inner assurance of being summoned – but all agreed that once a divine embarked upon his calling, he was irrevocably bound. As we shall see below, although a disparity between the ideal and the practice was often the case, the perception of propriety on both the part of practitioners and contemporaries persisted and influenced the actions of numerous scientific practitioners.

The most obvious place to begin our search for the roots of this tension between natural philosophy (as well as mathematics) and religion is in the universities, and here two important factors bear upon the issue at hand. First, the medieval concept of the unity of knowledge continued to animate the educational ideals of the scholarly community into the seventeenth century and beyond. In practical terms, this meant that early specialization was repudiated in favor of encyclopedic instruction in the entire arts and sciences curriculum to the extent that any educated person was deemed capable of contributing to any one of its constituents, if he so wished. Second, the conviction that grounding in the various arts and sciences was a prerequisite for the study of theology continued to command respect, as did the belief in the inherent interdependence of all disciplines, with theology, naturally, topping the pyramid. The product of such an educational ideal continued to be the "general scholar" and, for this reason, scientific investigation was usually only one component in a many-faceted intellectual enterprise. Clearly, such an educational ideal stands diametrically opposed to any notion of an autonomous status for science: not only might committed scientific study prove a hindrance to the pursuit of divinity as one's calling, but on a more basic level, any modification in the educational framework might threaten the underlying concept of the unity of knowledge. And we must remember that the universities were molded according to this old ideal of knowledge, not only as regards the curriculum, but also as regards the entire structure of ordinances.

The encyclopedic ideal of learning that informed higher education may well have impeded early efforts at scientific specialization (even as many aspiring mathematicians and astronomers managed to overcome such constraints). More seriously, however, prevalent beliefs regarding the preferred aims of knowledge – beliefs that

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were firmly embedded within the English collegiate structure – ensured that even after the completion of the general course of study, a learned secular career at the university was all but impossible. The medieval founders of colleges enjoined most fellows to pursue theology as their calling and, in the aftermath of the English Reformation, their Calvinist heirs stressed such a requirement, as they regarded Oxford and Cambridge as nurseries for a godly ministry. In addition, they insisted even more fervently on the need to regard all secular learning as subservient to theology. Thus, William Perkins was hardly unique in exhorting parents that just as Hannah had dedicated her son Samuel to God so their "first and pricipall care must bee for the Church; that those of their children which have the most pregnant wits, and be imbued with the best gifts, be consecrated unto God, and brought up in the studie of the Scriptures, to serve afterward in the Ministery of the Church" (Perkins 1626–31, iii. 694). Decades later, Richard Baxter still insisted on the pre-eminence of theology. When considering a vocation, he wrote, "the soul's advantage must guide your choice: as suppose that a lawyer were as profitable as to the public good as a divine, and it is the way to far more wealth and honour; yet the sacred calling is much more desirable for the benefit of your souls" (Baxter 1825, ii. 584).

In principle, then, well into the seventeenth century all Calvinists agreed that a clerical vocation was the most proper course for a scholar to follow. Most of them also agreed on the necessity of raising a learned ministry. Where they differed was on the extent and depth of secular learning deemed requisite (or safe) for a divine. While many commentators remained vague on the topic, among Puritans authors especially may be detected a desire to pare down the educative experience and circumvent as much as possible any temptation on the part of young men to immerse themselves in secular learning. According to John Udall, "they are the greatest foes of mans soule, that doe tickle the eares with painted eloquence, studying rather for pleasing speeches, to delight the sences, then the power of the spirit to cast downe mans pride" (Udall 1596, H2^{v}). A more moderate contemporary, William Perkins, shrewdly invoked the practice of the Jesuits whose novices, he pointed out, turned to theology after only a three-year study of secular learning. The example of their great enemies, Perkins added, should "shame some that spend so many yeares in the Universitie," and yet fail to become good ministers: "as they are to intende this calling as the most rare and excellent, so this must teach them likewise, to hasten to furnish themselves with all good helps and meanes, . . . and not too long to stick in those studies, which keep a man from the practise of this high function: for it is not *to live in the University*, or in the Colledge, and *to study*," that makes a man a good minister (Perkins 1605, 23, 26–7; emphasis in original). Elsewhere, Perkins chastized the "carnall courses of many in the university "who thinke it sufficient to live there, and send out other men" to spread God's word. He admonished them "not to linger and lye rioting too in their *speculative* courses, but when they are competently furnished with learning, and other qualities befitting that calling: let them shew themselves willing and readie to yeeld their service to the *Church"* (Perkins 1605, (2) 117–18; emphasis in original).

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High churchmen viewed matters somewhat differently, as can be seen from William Laud's reproach of the Puritan single-minded preoccupation with religious literature. One would have thought, the Archbishop thundered, that young students should be encouraged to pursue for several years the entire cycle of learning, "the better to enable them to study divinity with judgement." Focusing too early on Calvin's *Institutes* before they are well grounded in other learning," he warned, would "hinder them from all grounds of judicious learning" and "possess their judgments before they are able to judge" (Laud 1847–60, v. 117). John Milton shared at least this with Laud when he deplored a situation in which young men, in their zeal to become divines, lost sight of the study of good letters. "There is really hardly anyone among us," he wrote, "who, almost completely unskilled and unlearned in philology and philosophy alike, does not flutter off to theology unfledged, quite content to touch that also most lightly . . . a practice carried far enough to make one fear that the priestly ignorance of a former age may gradually attack our Clergy" (Milton 1953–80, i. 314).

The attempt of some Puritan tutors to indoctrinate their charges and shield them as much as possible from over-exposure to secular learning is easy to understand. It involved a recognition that within the existing humanist educational framework the identity of the scholar preceded his imprinting as a divine. It should be remembered that the student arrived at Oxford and Cambridge after having endured a rigorous philological and literary training in grammar school, where love of learning was instilled by both ferule and cultivation of fame – a cornerstone of the contemporary pedagogical system. The practice continued at university, where little was offered in terms of formal theological instruction, while erudition tantalized numerous scholars for whom no sacrifice was too formidable. Understandably, the incongruity between the habits inculcated in the schools and those expected from a Christian – not to mention a cleric – drew commentary, but few so poignant as that proffered 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 . . . . 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. (Law 1978, 250–1)

The recollections of students, as well as the exhortations of concerned divines, substantiate Law's complaint. More enlightening than most is Samuel Ward's diary, begun in 1595 while Ward was a third-year MA student in Cambridge. Enthusiastic,

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hard-working, and quite an accomplished student who took pride in his scholarly attainments and showed resentment toward those who competed with him or failed to recognize his excellence, Ward nevertheless agonized over such a seemingly self-evident moral failing. "My desire of vayne glory, when we were gathering hearbes . . . wherby I might se how prone when occasion is gyven *superbire*," he wrote on 2 June 1595. On 11 June he likewise recorded "Thy sin of pride, beyng with Mr. [Henry] Briggs in Burwell his shop"; "My thought of prid att reading of Greek" on the 15th; and, four months later, "my prid in doying things in geometry." Similar confessions abound. On 19 February 1596 Ward repented his "thought of prid as I went to the Priorums [dialectics exercises]," and in late July he was contrite over the "proud thought of my self in chronology, preferring my self to Mr. House." As much as Ward agonized over his devotion to secular learning and his succumbing to vain-gloriousness, he was troubled by his apparent inability to raise his sights higher: "my over great care of humane studies, when the Lord hath called me to the study of mortification," he lamented in the summer of 1595 and, a year later, "my earnest meditation on philosophy, when I should have been occupied in thoughts tending to edification." Ward was most eager to obtain a fellowship in Cambridge – though he feared that his speech impediment might render him unqualified for the ministry – but as it turned out, he was ineligible for one in his own college, as Christ's College already had a fellow from his county. Wavering between theology and medicine, his vocational crisis appears to have peaked when "having a place offered me to read mathematics, [I] began to bethink me what profession I should follow." In late January 1598, Ward finally secured a fellowship at Emmanuel College and drew a long list of "assurances," affirming for him his "calling to the ministry." In May 1598 his clerical resolution was finalized: "My purpose this day," he wrote, is "taking a new course of life . . . more diligently to serve God." Having resolved his crisis and settled in his fellowship and new career, Ward, not surprisingly, lost interest in his diary as well (Knappen 1966, 107–8, 111–13, 116, 128; Sidney Sussex College, Cambridge, MS 45 fols. 22, 28, 35^{v}; Todd 1992, 242, 262).

Ward's case nicely illustrates a dilemma central to intellectual and religious life in the early modern period: to what extent was it possible "to train fully in the humane arts, and then *consciously* decide to turn to God"? (Morgan 1986, 113; emphasis in original). To judge by the recollection of certain beneficiaries of the system, or their biographers, such a progression was hardly possible, as only religious conversion served to set the heart straight. Henry Jessey's biographer nicely summarized the manner in which the former's learning was transformed proportionate to his conversion: "while he was thus pursuing after natural knowledge, it pleased the Lord to give him Spiritual Understanding by converting his Soul to himself . . . . Nor did grace put any interruption to his studies, but farther enlightned him to see his own Darkness, and Ignorance, and so regulated both him and them, that we find him afterward steering a course more directly useful for a Minister of the Gospel, to which employment God designed him, and he chiefly inclined unto" (E. W. 1671, 3). Following his spiritual crisis, Thomas Traherne, while still recalling fondly the

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exciting scholarly horizons opened for him at Oxford during the 1650s where he had acquired the "Taste and Tincture of another Education," nevertheless singled out what he considered the defect of such a program. "There was never a Tutor that did professely Teach Felicity: tho that be the Mistress of all other Sciences. Nor did any of us Study these things but as *Aliena*, which we ought to hav[e] Studied as our own Enjoyments. We Studied to inform our Knowledg, but Knew not for what End we so Studied. And for lack of aiming at a Certain End, we Erred in the Maner" (Traherne 1958, i. 132). The theme became a topos for numerous biographers and eulogists, whose (mostly Puritan) subjects invariably described the "progress" from the ranks of the mere learned to those of the godly. Thus, having noted the proficiency gained by Robert Bolton in mathematics and philosophy at the turn of the seventeenth century, his biographer continued: "But all this while though he was very learned, yet he was not good, he was a very meane scholler in the schoole of Christ (Bagshaw 1632, B3-B3^{v}). Equally "deficient" was John Janeway, according to his brother/biographer, who lamented that even as he made great progress in his mathematical studies in the early 1650s yet "all this while it is to be feared, that he understood little of the worth of Christ, and his own soul; he studied indeed the heavens, and knew the motion of the Sun, Moon and Stars, but that was his highest; he thought yet but little of God." Ironically, the brother concluded by varying on that theme of Baronius made famous by Galileo – but to a far different purpose: "what a poor thing it was to know so much of the heavens and never come there" (Janeway 1675, 4–5).

Even when factoring in the centrality of conversion to the Puritan experience, and the corollary belittling of the individual's previous life, we discover among contemporaries a persistent concern with the almost exclusive focus of the course of study on the acquisition of erudition and the quest for praise and glory as its primary motive. Such uneasiness prompted some of the most learned men of the age to exhort students and educators to heed these very pitfalls and not make learning an end in itself. William Pemble, one of the most promising intellectuals in Jacobean Oxford, adjured youth to pursue secular knowledge only insofar as they could keep God uppermost in their mind. So often, he cautioned, a deep gulf separated learnedness from grace, which he ascribed first to "pride and selfe-conceit" taken by men in their learning and, second, to the "surfeiting upon humane and inferiour learning, with contempt of divine studies." Too many of his contemporaries, Pemble regretted, emulated the likes of Poliziano and Lipsius – "True Humanists, that relish nothing but what is of man" – who devote themselves to literary studies, "having the sacred Scriptures and mysteries of Divinity in basest contempt." Even more alarming to him was the "Prophane study of sacred things, to know onely, not to do, to satisfie curiosity; or give contentment to an all-searching and comprehending wit; who study Divinity as they would do other Arts, looking for no further ayde than Natures ability, or as men do trades and occupations, meerely to make a living by it" (Pemble 1659, 8–9).

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Pemble was tackling no new territory. Half a century earlier John Rainolds had attempted to negotiate the fine line between condoning secular learning and subjugating it to Christian needs. In one of his inaugural orations prefacing his celebrated Greek lectures at Corpus Christi College, Oxford, Rainolds utilized the old biblical metaphor concerning the "spoils of Egypt" to argue that "it may be lawfull for Christians to use Philosophers, and books of Secular Learning, but with this condition, that whatsoever they finde in them, that is profitable and usefull, they convert it to Christian doctrine." The sanctioning of pagan authors, however, was predicated on the assumption that their study would be carried out in order to fortify religious ends: "wee may defend Philosophy even to death, we may study profane Arts, but so, as they bee referred to pious things." He adamantly rejected any suggestion even remotely suggestive of "double truth," sneering even at the common justification heard in schools that "Wee may speak as Philosophers, we are not Divines yet." For Rainolds, philosophy needed to be informed by religion, lest heresy, the offspring of wanton secular learning, result. Toward the end of the oration Rainolds skilfully manipulated elements from the statutes of the college in order to construct a feigned exhortation of the founder, Bishop Cox, admonishing his students to devote "all your studies to Gods glory," as "this College of mine was founded for Divinitie sake" (Rainolds 1638, 62, 69–75, 96–7, 126, 129).

Rainolds' one-time disciple, the anti-Calvinist Thomas Jackson, endorsed his Puritan mentor's position on the proper relations between philosophy and religion. Too often, Jackson cautioned, "doth the curious speculation of creatures visible divert the minds of many from the invisible creator unto whom the sight of these by nature not misleveled by inordinate or unwildy appetites would direct all." "Disputative Atheisme," in his eyes, was the disease of those who "professe noble sciences" and develop an exalted view of their worth. Rash to generalize from their limited perspective and eager to expand their dominion and sovereignty over other disciplines, they beget pernicious results: "Now the power and wisedome of God being especially manifested in the workes of creation, in the disposition of things created, and in matters manageable by humane wit or consultation; Satan by his sophisticall skill to worke upon the pride of mans hart, hath erected three maine pillars of Atheisme or irreligion, as so many counter sorts to oppugne our beliefe or acknowledgement of the divine providence." Only God's assistance is capable of rectifying the "errors incident to the Astronomer and Politician with the false inductions to persuade them" (Jackson 1625, 45–7).

As noted above, convictions regarding the proper end of learning and the preferred vocation for its beneficiaries were not only shared by all English Calvinists – at least until the middle of the seventeenth century – but were literally enshrined in the statutes of all Oxbridge colleges. Hence, a formidable constraint facing young scholars who desired to remain at Oxford or Cambridge was the requirement that they be ordained and pursue theological studies soon after graduating MA. Their ability to acquire (or retain) a fellowship – the prerequisite for remaining a member of the university – was dependent on such a course. As Brian Twyne wrote his father

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in 1601: "I cannot be fellowe unlesse I be also minister at the same time: if not, you well knowe that there is no abidinge here for me" (H. G. S. 1926–8, 240). The intentions of founders of colleges and their successors were clear. With respect to expectations for membership, Mildmay's statutes for the Puritan Emmanuel College were almost indistinguishable from the stipulations of his medieval Catholic predecessors: "in establishing this College we have set before us this one aim, of rendering as many persons as possible fit for the sacred ministry of the Word and the sacraments . . . . Be it known therefore to any Fellows or Scholars who intrude themselves into the College for any other purpose than to devote themselves to sacred Theology and in due time to labour in preaching the Word, that they render our hope vain" (Mildmay 1983, 60). True, many colleges reserved a fraction of their fellowships for physicians and lawyers – and the former often became an oasis for men of science – but the total number was insignificant. Equally problematic, the competition for these fellowships was quite stiff as the pool of applicants was not limited to would-be scientific practitioners, but open to anyone seeking to avoid (or at least postpone) theological studies. Richard Lower, for example, told Robert Boyle in 1664: "I have been out of my place above a year and a half since, for not being in holy orders, without which I could not keep my student's place, unless I can get a physician's place in the college, there be two allowed, but I had not the favour of friendship to obtain either" (Boyle 1772, 6:474). Further to the point, not infrequently even those meagre provisions for non-clerical fellows were challenged, as happened at New College, Oxford, in 1595, when two astronomy students were compelled to obtain an official clarification of the statutes establishing "that it is lawfull for any man to studie and professe the liberall sciences of Astronomy" (New College, Oxford, Archives, MS 957, p. 6, old pagination).[1] It thus becomes clear why so many young mathematicians either vacated their fellowships voluntarily, or never even bothered to stand for election. They were weary lest the requirement to seek ordination and pursue the study of theology would bridle their ability to devote themselves to their cherished secular studies.

Many early modern scientific practitioners desired autonomy and legitimacy for what they hoped would become a new career and, consequently, not a few of them left the university in an attempt to establish their careers elsewhere. Thomas Hood and Edward Wright, for example, sought to do so by providing mathematical lectures in London, as well as by offering their services to the English imperialist enterprise. Others, such as Thomas Harriot and Thomas Hobbes, were fortunate to find private employment in learned households that enabled them to pursue their own studies more or less freely. By-and-large, however, they were pious individuals who both shared contemporary assumptions concerning the kind of calling most proper for learned men – even when attempting to follow a different calling – and agreed upon which activities were lawful and proper for a divine. And in this lay the tension. For,

[1] I'm grateful to the late Gerald Aylmer for this reference.

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as we shall see shortly, when scientifically-oriented men took orders and accepted livings, either out of conviction or from necessity, they were cognizant of certain inevitable consequences of their choices on their future course of studies. They understood that to a large extent their unfettered secular studies would have to be sacrificed, not only because these were deemed unbecoming to a cleric, but because they would be expected to devote their energies to, if not the cure of souls, at least the waging of the wars of the Lord. Consequently, what was required in addition to a total reorientation of their studies – certainly up until the 1650s, when natural theology emerged as a viable option, as we shall see below – was a lengthy period of philological and theological training that would render their future efforts possible, and on the merits of which recognition and rewards would be reaped.

Hardly surprising, therefore, that the decision facing numerous accomplished men in their twenties came to be perceived as something akin to sacrifice, and many represented their imminent entry into divinity as a valediction to secular learning. John Lyly's *Euphues and his Ephebus* (1579) nicely articulates the impending act of resignation. After ten years of study at university and after having served as a highly esteemed professor who "only search[ed] out the secrets of nature and the hidden mysteries of philosophy," Euphues was on the verge of publishing his lectures in three volumes when the moment to contemplate his life arrived:

> Why, Euphues, art thou so addicted to the study of the heathen that thou hast forgotten thy God in heaven? Shall thy wit be rather employed to the attaining of human wisdom than divine knowledge? . . . What comfort canst thou find in philosophy for thy guilty conscience, what hope of the resurrection, what glad tidings of the Gospel . . . farewell rhetoric, farewell philosophy, farewell all learning which is not sprung from the bowels of the holy Bible. . . . Euphues, having discoursed this with himself, did immediately abandon all light company, all the disputations in schools, all philosophy, and gave himself to the touchstone of holiness in divinity, accounting all other things as most vile and contemptible. (Lyly 1964, 142–4)

Euphues' fictional abdication was experienced in painful reality over a century later by Joseph Addison. After graduating MA in 1693 the would-be literary writer found himself obliged to pursue divinity and, to this end, was incepted in the Faculty of Theology the following year. His wish, if at all possible, to avoid just such a course is evident from a poem he published at the same time, the last six lines of which were unambiguous:

> I've done at length; and now, dear friend, receive
> The last poor present that my muse can give.
> I leave the arts of poetry and verse
> To them that practice 'em with more success.
> Of greater truths I'll now prepare to tell,
> And so at once, dear friend and muse, farewell. (Smithers 1968, 27–8)

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At the last minute Addison succeeded in his bid for a non-clerical career, but most of his contemporaries who contemplated a learned secular career were not so fortunate. For a long time to come scholars found the Church as the only means suitable for (and capable of) sustaining a life of learning.

In practice, ordination and the study of theology did not prevent university dons from continuing to cultivate secular studies, just as some of those who settled into Church livings did not abandon their own secular researches. The point I am trying to make, however, is that for the most part their sense of propriety ensured their keeping much of their labors private, and often as an off-shoot of more "proper" occupations. On occasions when those university divines did venture into print, they invariably felt compelled to account for the seeming impropriety of their action. Robert Burton's case in instructive. Comfortable with the sheltered and studious life he led at Christ Church, Oxford, Burton was equally proud of his magnum opus, *The Anatomy of Melancholy* – producing five editions of it during his life-time – and exonerated himself in various ways: at times facetiously, as when blaming the "roving humour" of his education: "Something I have done, though by my profession a divine, yet . . . out of a running wit, an unconstant, unsettled mind, I had a great desire (not able to attain to a superficial skill in any) to have some smattering in all, to be [a somebody in general knowledge, a nobody in any one subject]." At other times more seriously by accentuating the relevance of his work as well as by cautiously insisting that his book was merely the product of his leisure hours. Noteworthy, too, is Burton's distaste for controversial theology: "Not that I prefer [humanity] before Divinity, which I do acknowledge to be the Queen of professions, and to which all the rest are as handmaids, but that in Divinity I saw no such great need. . . . But I have been ever as desirous to suppress my labours in this kind, as others have been to press and publish theirs" (Burton 1978, 1:17, 34–5, 37).

Burton's younger contemporary, Henry More, was just as desirous of pursuing a quiet life of scholarship. Already as an undergraduate in Cambridge, when asked by his tutor who "observed [his] Mind to be inflamed" with learning, "why [he] was so above Measure intent upon my Studies" – suspecting "that there was only at the Bottom a certain Itch, or Hunt after Vain-glory; and to become, by this means, some famous Philosopher among those of my own Standing," More replied "to know, That I may know" (Ward 1911, 62). Even more so than in Burton, More's poetry and philosophy were inseparable from his religion. Yet he, too, often felt the compunction to account for his studies, as can be seen in the preface to the 1662 edition of his philosophical writings. Taking his credo from Philo's citing of Aaron to the effect "that every Priest should endeavour, according to his opportunity and capacity, to be also as much as he can a Rational man or Philosopher," More produced the following apologia:

> I conceive Christian Religion rational throughout, and I think I have proved it to be so in my *Mystery of Godliness*. Which I must confess was the main, if not the only, scope of my anxious search into Reason and Philosophy, and without which I had proved but a

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> lazy and remiss enquirer into the nature of things. . . . But having this so eminent a scope in my view . . . I make account I began then to adorn my Function, and amongst other Priestly Habiliments, in particular to put on the Λόγον or Rationale, the Sacredotal Breast-plate, which most justly challenges place in that region which is the seat of the Heart. (More 1978, iv–v)

Equally emphatic was More's occasional expression that "he should not have known what to have done in the World if he could not have preached at his Fingers' Ends" (Ward 1911, 9).

It is important not to underestimate the import of such pronouncements or dismiss them as mere pious rhetoric or instances of self-fashioning. The duties and conduct of a divine were as much a concern to the minister himself as they were to his colleagues and superiors, for any deviation from the perceived norm was liable to elicit – in addition to scruples on the part of the divine – a reaction from the community. The grounds for such a reaction can easily be missed because the impinging of philosophy on theology often resulted in a blurring of charges vis-à-vis doctrinal and vocational impropriety. A noteworthy instance is the exchange between Anthony Tuckney and William Whichcote. Often studied in the context of the emergence of Neo-Platonism in Cambridge, and a crucial early example of the reshuffling of the relations between faith and reason, Tuckney's strong criticism of his former pupil also illuminates the ability, even duty, of disciplining errant members. Even while a fellow of Emmanuel, Tuckney charged, Whichcote was "cast into the companie of very learned and ingenious men; who, I fear, at least some of them, studyed other authors, more than the scriptures; and Plato and his schollars, above others." Matters went from bad to worse, as the continued infatuation of a young divine with philosophy quickly spilled over into his preaching: "I have heard; that, when you came to be Lecturer in the Colledge, you in a great measure for the yeare laid-aside other studies; and betook yourself to Philosophie and Metaphysicks: which, some think, you were so immersed in; that ever since you have bin cast into that mould, both in your privatt discourse, and preaching; both for wordes and notions: both which, I fear, have rendered your ministry less edifying" (Whichcote 1753, 36–8).

Not surprisingly, the structural constraints that inhibited university men from openly pursuing secular learning produced appeals to increase the pool of fellowships available for those preferring the arts and sciences to the three professions, as well as to waive the need for ordination. Roger Ascham made the case in 1553 when he entreated Sir William Cecil to make it possible for him to return to Cambridge by dispensing with the professional statutory requirements: "for if som be not suffered in Cambrige to make the fourth ordre, that is surelie as thei list, to studie the tonges and sciences, th'other three shall naythe be so many as thei shold, nor yet so good and perfitte as thei might. For law, physick, and divinitie need so the help of tonges and sciences as thei can not want them, and yet thei require so a hole man's studie, as he may parte with no tyme to other learning except it be at certayn tymes to fetch

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it at other man's labor" (Ellis 1843, 16–17). Similarly, John Dee argued a decade later that although the universities are furnished with divines and philologers, "yet, forasmuche as the wisdome infinite of our Creator is braunched into manifold mo sortes of wunderfull sciences, greatly ayding our dymme sightes to the better vew of his powre and goodnes, wherin our cuntry hath no man . . . hable to set furth his fote or shew his hand," in the mathematical sciences, "(by which . . . the huge frame of this world is fashioned, compact, rered, stablished and preserved) and in other sciences, eyther with these collaterall, or from them derived, or to themwardes greatly us fordering (Dee 1854, 6–7).

These and similar efforts came to naught, as did an early eighteenth-century radical proposal to revoke altogether the requirement for ordination, which its anonymous author viewed as injurious to the talents of students as well as harmful to the state because of the Church's inability to absorb them all. The author reasoned, "amongst so great Number of Clergy, who by their habitual Application, and Attention to study in their younger Years, become frequently Men of active and enterprizing Minds; it must needs happen that many of them should find nothing in the Course of their Fortune to employ their Heads or to satisfie their Ambition, and then they are under a very unhappy Necessity. From all Secular Employments they are refrained by the sanctity of their Orders; from the Service of the Church they are excluded as Supernumerary." Indeed, the requirement of ordination accomplished nothing but duplicity:

> For is it not a solemn Mockery that Men should declare before God, that they take Orders by the call of Christ, and by the inward impulse of the Holy Ghost, for the Promotion of God's Glory and Service? When it is visible that they do it to save a poor place in a College, without any other view present or future of doing God Glory, or Religion Service, or of helping themselves by that Character. And when it is plain after this solemn Entry into Religion, that many of them never affect or endeavour to be any way useful to it, but spend an idle and worthless Life in the Cloyster where they were bred, and at last lay their Bones in it. (Anon. 1710, 2–3)

In the meantime, however, few university men consciously adopted the cynical attitude that Christopher Marlowe had Dr. Faustus contemplate:

> Settle thy studies, Faustus, and begin
> To sound the depth of that thou wilt profess.
> Having commenced, be a divine in show,
> Yet level at the end of every art,
> And live and die in Aristotle's works. (Marlowe 1998, 140)

Rather, upon taking orders and assuming a clerical career, the studies and concerns of scholars turned divines began to veer off into a radically different direction, as can also be seen in the fortunes of imaginative writers turned divines. Although the

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vicissitudes of poets and men of science might seem at first glance an unpromising comparison, they shared a similar mindset in terms of their understanding of the meaning of ordination and the future it augured for their creative output. Equally important, the careers of both groups substantiate my claim regarding the imprinting of the identity of the scholar prior to that of the divine – who can doubt that their passion and proficiency matured long before graduation, let alone ordination? – with a resultant inner conflict vis-à-vis their future.

The case of John Donne is particularly instructive and well-documented. For years the poet had resisted numerous suggestions and pressures to enter the Church. Only in 1614, faced with James I's unyielding refusal to advance him except as a divine, did Donne relent. His first biographer, Isaac Walton, presented an idyllic image of this progression into a higher calling: "And now all his studies which had been occasionally diffused, were all concentred in Divinity. Now he had a new calling, new thoughts, and a new imployment for his wit and eloquence." Equally edifying were Walton's comments on Donne's literary works: "The Recreations of his youth were *Poetry*, in which he was so happy, as if nature and all her varieties had been made only to exercise his sharp wit, and high fancy. . . . It is a truth, that in his penitential years, viewing some of those pieces that had been loosely . . . scattered in his youth, he wish't they had been abortive, or so short-lived that his own eyes had witnessed their funerals" (Walton 1973, 48, 61). What Walton's carefully constructed effort to preserve Donne's sanctity failed to provide, however, was the agony Donne experienced on his road to ordination, and his persistent concern for the fate of his writings. Just prior to ordination, he even felt compelled to publish an edition of his poems, "not for much publique view, but at mine own cost, a few Copies." "I must do this," he added, "as a valediction to the world, before I take Orders" (Gosse 1899, 2:68). The project came to naught and none of Donne's poems were published during his lifetime. Indeed, according to Ben Jonson, ever since Donne "was made Doctor [he] repenteth highlie and seeketh to destroy all his poems" (Jonson 1974, 1:136). Yet Donne's pride in his secular poems never abated – nor, for that matter, did his desire that they be preserved. The pride and protective attitude Donne exhibited toward his works, as well as his determination not to publish them, shared much in common with the attitude of numerous men of science. The difference lay in the far greater popularity of literary works – which resulted in the publication of Donne's works shortly after his death – while the papers of so many scientific practitioners were used to make pies, wrap herrings, or "sacrificed to 'the tayler's sheeres'" (Hunter 1975, 65).

George Herbert, too, contemplated a secular career while serving as the Cambridge Orator. Following a protracted indecision, however, he resolved to take orders and "labour to make [the profession] honourable, by consecrating all my learning, and all my poor abilities, to advance the glory of that God that gave them" (Walton 1973, 277). The resolution had important consequences for the reorientation of Herbert's poetry as well as for the non-circulation of his poems in manuscript. But just as in Donne's case, no sooner was Herbert laid to rest than his sacred poetry was

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published. Significantly, even such a seemingly edifying edition called for the printer's apologia: "As for those inward enforcements to this course (for outward there was none) which many of these ensuing verses bear witnesse of, they detract not from the freedome, but adde to the honour of this resolution in him. As God had enabled him, so he accounted him meet not onely to be called, but to be compelled to this service" (Herbert 1635, ¶2 v).

These publications established the pattern for numerous other literary works of deceased imaginative writers turned divines, with the publishers carefully perpetuating the authors' concern during their life-time to represent their forays as juvenilia. As modern editors of such works have established, many authors were unable to utterly lay aside their muse, and they continued to compose long after becoming divines. In so doing, they were not different from clerical scientific practitioners who kept busy in the privacy of their studies, except that in their case no market existed for their productions. A revealing instance of the public defense of the propriety of a posthumous publication of imaginative writing is offered by Humphrey Mosely in his preface to William Cartwright's works:

> He was a *Divine*, some body will like his *Poems* the worse for it; but such will mistake both Him and his Book: for as here is nothing his *Function* need blush at, so here is but one Sheet was written after he entred *Holy Orders*: some before He was twenty years old, scarce any after five and twenty, never his Business, only to sweeten and releeve deeper Thoughts . . . . The highest Poet our Language can boast off [Donne] . . . you'l grant was afterwards an excellent Preacher; and in the judgement of . . . a most Learned *University*, our *Author* was so too. (Cartwright 1951, 831–2; emphasis in original)

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The soul-searching that imaginative writers and general scholars experienced before committing themselves to theology, as well as the ramifications of their resolutions on their subsequent careers, was paralleled by the experience of mathematicians and natural philosophers. Richard Norwood's diary provides unique insight into the mind of a mathematician on the eve of his religious conversion. In his early twenties, the non-university practitioner, having read Agrippa's *The Vanity of Sciences*, came to "understand the nature of human learning and the extent and bounds of arts in some measure, and that there was no such excellency nor extent in learning as that a man should make it his *summum bonum*, as I was apt to do. . . . It was only religion and piety that could promise that which I had no affection at all." For two years he debated whether he ought to postpone a full conversion and "proceed in mathematical studies and practices as I had before, not meddling with divine things" or, just the opposite, "give over my studies, aims, and endeavors, take a wife, and betake myself to some more common calling and course of life and never look after any high things?" Finding certainty in neither, Norwood "wished there were some middle estate" analogous to that embarked on by ancient philosophers "who by their

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virtues and endowments had deserved much of the world and in their moral conversation seemed not to be inferior to the better sort of Christians." But, as it became increasingly clear that for him no middle way existed, he resolved that "the estate of a true Christian was the best and surest of all other conditions" even if he as yet "had no courage nor full resolution to press earnestly for it" (Norwood 1945, 44, 62–7). Even more striking was the conversion of the precocious mathematician John Janeway, mentioned earlier. After studying with both Oughtred and Seth Ward while still at Eton, Janeway underwent a religious conversion soon after coming up to Cambridge and, subsequently, "Not that he looked upon humane learning as useless: but when fixed below Christ and not improved for Christ; he looked upon wisdom as folly, and learning as madness, and that which would make one more like the Devil more fit for his service" (Janeway 1675, 7).

While non-Puritans may not have experienced such literal conversions, they, too, faced similar dilemmas. Arthur Wilson, who studied at Oxford between 1631 and 1633 while in his mid-thirties, devoted himself first to mathematics and then to medicine. Subsequently, "being much solicited, by some able friends which I had gained in the colledge, to the studie of divinitie; I had a long strife in my selfe about it. For, though I knew divinitie to be the queen of arts, yet I found my selfe fitter to learne, than to teach. And in that studie I absolutely apprehended, that I must forsake the world, as S. Paul saith . . . *set apart for the ministrie, and dedicate my self to it*. Which I knew not whether I should be able to doe having had my breeding in so much liberty. For whosoever, in my opinion, undertakes that profession, and makes anie more use of the world than for necessaries for himselfe and familie, is out of his way" (Wood 1813–20, 3:321–2; emphasis in original). Matthew Robinson, who was elected fellow of St. John's College, Cambridge, in 1650, considered medicine as his profession. But in 1651 a family living fell vacant: "This he thought the greatest affliction that ever had befallen him," Robinson wrote in the third person, "to leave his present paradise and change his course of life and studies: yet the importunity of his mother and dearest relations called him down, and would receive no naysay. Loth was he to lose that his inheritance and as loth to forego that his beloved fellowship." Ultimately, he accepted the living, but when some years later Robinson wrote a treatise on horsemanship, he refused all requests to publish it, "thinking it not for the honour of his cloth to be ἱππογνώμων, famous only for skill in horses" (Robinson 1856, 33–4, 48).

The caution informing general scholars was more pronounced still with men of science. Sir Samuel Morland recalled in his autobiography c. 1653 that "I was solicited by some freinds to take upon mee the Ministry, for which, fearing I was not fitly qualified, I betook myself to the study of the Mathematicks" (Dickinson 1970, 112). Five years later it was John Ray's turn to agonize over ordination:

> My present condition is such that I must of necessity enter into orders, or else live at great uncertainties, and expose myself to the mercy of men for my livelyhood and continuance here. I am not resolved to enter into orders, if so be I stay here, but rather

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> the contrary, it consisting not with those designes which I intend to pursue. Now, if I shall bid farewell to my beloved and pleasant studies and employments, and give myself up to the priesthood, and take to the study of that which they call divinity, I thinke it were the best way to throw myself into the country, and make such provision for this world as other men doe, and make it my business to execute the priest's office. (Ray 1928, 16)

For his part, John Locke was more categorical in 1666 when justifying his refusal to be ordained (upon which his ability to keep his Christ Church studentship was contingent) and his declining several good livings because he wished to continue with another course of studies. Otherwise, he wrote a friend, "should I put my self into order[s] and yet by the meanesse of my abilitys prove unworthy such expectation, (for you doe not thinke that Divines are now made as formerly by inspiration and on a suddain, nor learning caused by laying on of hands) I unavoidably loose all my former studys and put my self into a calling that will not leave me . . . and from whence there is noe desending without tumbleing" (Locke 1976–89, 1:303–4).

Locke was fortunate; he was able to obtain a royal dispensation enabling him to retain his studentship without taking orders. Others were not so fortunate, as we noted in the case of his contemporary at Christ Church, Richard Lower. Unfortunately, the range of opportunities open to scientific practitioners was limited in the extreme, owing to the scarcity of endowed scientific positions that would enable one to pursue science in a secure and independent manner. (In 1700, for example, Oxford, Cambridge, and Gresham College combined had a total of ten professorships in the mathematical sciences, natural philosophy, and medicine). Nor do we find in England the kind of court culture that was instrumental in supporting numerous practitioners on the Continent. Nonetheless, some practitioners, as we noted earlier, were willing to pursue the risky enterprise of marketing their scientific expertise by serving as private tutors or advisors to government officials. Alas, more secure (and permanent) rewards for such services came invariably in the form of offers of church livings, as both monarchs and members of the upper class found it cheaper for themselves and more beneficial to their clients if, by way of compensation for scientific services, they bestowed a benefice – which returned the practitioners to square one. Thus, Richard Hakluyt received during the 1580s and 1590s several church positions as a reward for his geographical writings. Indeed, when in 1599 the Privy Council urged the Archbishop of Canterbury to bestow a living in London on the geographer, it was explicitly stated that Hakluyt "hath bestowed his tyme and taken very great paynes in matters of navigacion and dyscoveryes, a labor of great desert and use, wherein there maie be often occacion to imploie him, and therefore our desire ys for the good of her Majesty's service that he might be provided of some competent living to reside in these partes" (*APC* 1890-, 300–1). Hakluyt's conscience, however, prevented him from continuing to hold sinecures, and he thus announced in his 1600 dedication of the third volume of his *Principal Navigations* that,

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having trained in the previous three years a worthy successor to carry on the work of cosmography in the person of John Pory, he now bid farewell to the subject, having long since foreseen "that my profession of divinitie, the care of my family, and other occasions might call and divert me from these kinde of endeavours" (Hakluyt 1935, 2:474).

Hakluyt's career pattern was hardly unique. Many had attempted to pursue a "scientific career" before eventually falling back on divinity as their livelihood. Thomas Lydiat, for example, who resigned his New College fellowship in 1603 in order to devote himself to mathematics and chronology, sought patronage that would deliver him from the need to take orders and assume a living, and thus pinned his hopes on Prince Henry. But the death of the young heir to the throne in 1612 put an end to his aspirations, and Lydiat accepted the family's living of Alkerton – where he continued as best he could to pursue his scientific studies (Feingold 1984, 48–9, 55–6, 146–52, and *passim*). Similarly, during the early seventeenth century, Edmund Gunter, Christopher Wren Sr., and Robert Payne, all stood as candidates for one of the Gresham professorships, only to be frustrated in their efforts. Consequently, they resumed their theological studies at the university and eventually accepted livings. In the case of Gunter and Gellibrand, however, fortune intervened, and they managed to revive their original aspirations. Gunter capitalized on Henry Briggs' appointment as the first Savilian professor of geometry at Oxford and replaced him as Gresham Professor of Geometry in 1619 (Feingold 1984, 69, 171–85 and *passim*; idem 1999, 178–83). Gunter's sudden death seven years later, in turn, provided Henry Gellibrand with the opportunity to vacate the living he had accepted in the absence of scientific positions in 1623 and to succeed him into the professorship. Robert Payne, too, managed to continue his scientific investigations thanks to his employment as chaplain (and chemical operator) by the duke of Newcastle until the dissolution of the Welbeck Abbey circle forced him to return to Oxford as one of the Christ Church theologians (Feingold 1985). As for Wren, he retired to his living, pursuing his studies privately while his former scientific ambitions were sublimated onto his more celebrated son (Colie 1960).

Indeed, the perceived incongruity between a ministerial calling and the vocation of scientific practitioner explains the efforts by founders of mathematical chairs to provide a venue for those unwilling to take holy orders and even to discourage clerics from applying. Thus, Sir Henry Savile munificently endowed two professorships at Oxford, the incumbents of which were liberated from the need to abide by college statutes requiring members to seek ordination or leave the college. Savile further stipulated: "I expressly forbid my professors to accept any ecclesiastical benefice after their admission" and "if any person previously to his admission holds a benefice" he was obliged to resign it (Ward 1845–51, 2:281). The Statutes of the Lucasian Professorship provided the Cambridge professors of mathematics with the freedom to hold the position without ordination, and in 1675 Isaac Barrow proceeded to obtain for Newton – as well as for subsequent professors – the dispensation that allowed

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them to remain fellows of Trinity as well.[2] As for Gresham College, following the death of Edmund Gunter – who continued to hold his living with his Gresham Professorship – the trustees forced Henry Gellibrand, prior to his institution in 1626 as Gresham Professor of Astronomy, to pledge that "he [would] not hereafter take any calling or course upon him, but apply himself wholly to this, or else wholly leave the place" (Adamson 1980, 19).

The dearth of such positions, however, ensured that the old system whereby patrons bestowed church livings on deserving practitioners – often knowing full well that the beneficiaries would persist with their secular studies – would continue. Indeed, as we saw in the case of Hakluyt, at times that was the expressed intention. Nor did Archbishop Gilbert Sheldon expect John Pell to renounce his mathematical studies when conferring a living on him, as the following anecdote makes clear. When Pell complained to Sheldon that the Essex living was situated in a region notorious for unhealthiness, the Archbishop quipped "I doe not intend that you shall live there." No, retorted Pell one better, "but your grace does intend I shall die there" (Aubrey 1898, 2:124). Nor did Queen Elizabeth have any illusions regarding John Dee's abilities as a preacher when she promised to bestow on him various benefices. Dee was willing to accept such gifts, but when the Queen offered in the 1570s to make him a dean or bishop he declined on the grounds that "*cura animarum annexa* did terrifie [him] to deale with them" (Dee 1851, 13). Ultimately, Elizabeth rewarded the old mathematician with the Wardenship of Christ's College, Manchester. The fellows were quick to voice their complaint and soon several local clergymen complained that no "course of ministry is held there as was intended," since neither Dee, "being no preacher," nor the absentee fellows took care of religious instruction (HMC Salisbury MSS. 1883–1976, 12:643). While appreciative of the constraints that ordination imposed on clerical practitioners, contemporaries nonetheless sought to ensure that these men continue to contribute to the work of the community. Henry Briggs' 1623 letter to Thomas Lydiat is telling in this respect:

> If your calling, being of so high a nature, would give you leave seriously to intend other business, I should intreat you to strive to get out your meditations and great pains, and do demonstrate every thing as you go, without which I think you cannot have that

[2] The inability to recognize the constraints that ordination imposed on the individual's ability to pursue secular studies led scholars to misconstrue the events surrounding Newton's efforts to retain his Trinity fellowship without taking ordination. Aware of the tenor of Newton's later religious convictions, for example, Westfall interpreted Newton's efforts to procure in 1673 a law fellowship at Trinity – which would have dispensed him from taking orders by 1675 – as proof that he had already become a heretic (Westfall 1980, 330–3). However, there is no evidence that Newton had begun his serious study of theology in 1673, and it is more likely that he followed the route traversed by numerous other dons who wished to avoid taking orders. In 1673 it was Robert Uvedale who won, not so much because of his seniority as because it was obvious that Newton had no intention of turning to the study of law. Barrow's integrity and strong sense of propriety, coupled with concern over dangerous precedent, would not allow him to support Newton's request. However, recognizing the rationale behind Newton's wish, Barrow sprang into action two years later, and procured the required dispensation.

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> acceptance and applause that your great pains have deserved. But we that have no such eminent business may be busied about these trifles in respect, though in themselves they deserve to be of good account. (Halliwell 1841, 46–7)

Similarly, when Sir Jonas Moore was informed of John Flamsteed's intention to seek ordination, he wrote to him: "I hope the takeing the Ministry upon yow will not exclude your Astronomicall studdyes quite: but that yow may give Aym at least to some other to proceed" (Flamsteed 1995–2001, 1:278).

The dilemma of how to resolve the incongruity between secular interests and the demands of a religious calling persisted throughout the lives of our practitioners. We get another indication of the predicament through criticism levelled privately against them by family members and friends. Francis Potter, for example, having substituted his fellowship at Trinity College, Oxford, with a family living, continued to pursue there with zeal his scientific interests. However, when his elder brother Hannibal was ejected by the Parliamentary Visitors from his Presidency of Trinity College and came to reside with his brother, Francis' avocation deeply offended Hannibal, who reproached his brother for devoting his time to scientific pursuits rather than to divine truth, thereby neglecting "the prime object of all knowledge." Hannibal, in fact, went so far as to entreat in 1653 Francis' close friend, John Aubrey, to desist from praising the scientific and mechanical accomplishments of his brother: "You do it in love. [but] I pray be advised in it, You cannot go a speedier way to ruine him. He hath a wonderfull conceit? of himself, and is not ashamed to express often that mere will be famous for his being born there. The Scripture doth not speak in vaine, lest he be proud and fall into the condemnation of the Devil. I conceive him to be verie weak and erroneous in many of his notions, (not to say ridiculous) and sure GODs spirit is most with the humble. I see to my grief that his love to other fancies hath made him neglect the duty of his place, whereas all mathematicall inventions are farr below the saving on one poor Soul" (Bodleian Library, MS Aubrey 13 fol. 162).

What informed such a disapproving mentality, we noted earlier, was partly the entrenched conviction that secular learning should be subordinated to theology to the point of sacrifice. Failure to abide by such expectations generated tension in the minds of scientific practitioners – not to mention in the minds of censorious contemporary observers. Within such a perspective, we can appreciate Nathanael Carpenter's lament "when he lay upon his death-bed [that] it did much repent him, that 'he had formerly so much courted the maid instead of the mistress,' meaning that he had spent his chief time in philosophy and mathematics, and had neglected divinity" (Wood 1813–20, 2:422). During the 1690s, while not quite regretting his avocation, Bishop Narcisus Marsh – having been forced to flee the troubles in Ireland – still confided in his diary his doubts concerning his beloved labors in mathematics: "My time, for many days, hath been [spent] in hard study, especially in knotty Algebra, to divert melancholy thoughts these sad calamitous times, wherein I am forced to live from home, and do hear, almost every day, of the murder of some or other protestant. Yet my heart and hope is always steadfastly fixed on the Lord my

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God." And again, "Lord forgive me, for being engaged this day in a study not suitable to the occasion." In an earlier period he had thanked God for blessing him with the solution to mathematical theorems, and other truths: "O Lord, thy holy name be for ever praised for thus enlightening my understanding, and discovering to me hidden truths; thine be the glory, and continue Thou more and more to enlighten my mind and let me in the way of truth, especially unto true saving knowledge." Hence, his justifying his application to such studies is revealing: "O Lord, grant that in studying thy works, we may also study to promote thy glory (which is the true end of all our studies), and prosper, O Lord, our undertaking, for thy name's sake" (Marsh 1845, 24–5, 115, 119).

In addition to concerns about a seemingly frivolous waste of time and a neglect of proper duties, contemporaries also feared that an over-indulgence in the niceties of secular learning in general, and in the mathematical sciences in particular, could cause a man to succumb to vaingloriousness and even heterodoxy. John Beale recalled that his tutor at Eton, the "Ever Memorable" John Hales, opined that "much study in the mathematicks would tempt a man, that stood engaged to give [a] full account of the foundation of the Christian Religion. For, saith he, the authentical portions of the Holy Text, and many mysteries will not come under the clearness of mathematical demonstrations" (Worthington 1847–86, 1:185–7). Indeed, Robert Boyle judged the atheist who "denies the Authour of Nature" only slightly worse than the "Naturalist, that over-values the study of it" (Boyle 1999–2000, 8:12). Certain pedagogues in dissenting academies continued to perpetuate such views well into the eighteenth century. Isaac Watts, for example, believed that the study of mathematics "was neither necessary nor proper for any student but for those few who would make those studies their profession," while Timothy Jollie, Master of Attercliffe Academy (and teacher of the blind mathematician Nicholas Sanderson), forbade the teaching of mathematics "as tending to scepticism and infidelity" (Ashley Smith 1954, 109).

Fully aware of the potential conflict of interests between secular learning and the demands of their clerical calling, the "men-of-science qua divines" often attempted to keep their studies private by shunning any venture into print. Edward Davenant, for example, who was reputed by Christopher Wren to have been "the best mathematician in the world" during the Interregnum, refrained from publishing his manuscripts, for "being a divine he was unwilling to print, because the world should not know how he had spent the greatest part of his time" (Aubrey 1898, 1:200–1). Even a cursory survey would reveal that such a solution was adopted by a large number of scientifically-minded divines. Unfortunately, owing to the very nature of such private recourses, and the almost inevitable disappearance of the papers of such men following their death, we know relatively little of the profundity and range of interests of those who deliberately opted for obscurity. Many undoubtedly shared the frustration expressed by William Robinson who, in a 1633 letter to William Oughtred, wrote: "My natural genius led me to physic and mathematics, in both which I should have had some insight, if a more serious calling had not diverted me.

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God's will be done; my life is solitary, my companions books, my liberty retiredness, so that how I should be cured of this infirmity I well know not, but refer all to his blessed will" (Rigaud 1841, 1:19).

As for those divines who did seek publication, they invariably found it necessary to account for their action and demonstrate that their "transgression" was apparent, not real. Consider William Barlow, one of the fathers of English magnetism. In 1597 he dedicated his *The Navigators Supply* to the Earl of Essex, partly hoping thereby to fend off possible charges of misconduct:

> how strange it would seem unto some, that a man of my calling should deale in this Argument [magnetism]; that in deede did a little trouble me; easily conjecturing that many woulde thinke I have forgotten my selfe, and walked herein beyond the bounds of my profession. As for my Profession, I thank God I have exercised the preaching of the Gospell nowe these twentie yeres, in a countrey where both Preachers and Gospell have some store of adversaries: And I trust that my travaile therein hath not bin such, that I greatly neede be ashamed thereof, or can justly be chalanged, that I ever, as a man carelesse, neglected my Calling . . . . [But perceiving] that God nowe, towardes the ende of the worlde, had ordeyned the sayling Compasse to be the notable meanes and Instrument of this entercourse . . . I did therefore judge it a matter not unfit for a Preacher of the Gospel, to set to his helping hand for advancing a Faculty that so much tendeth to Gods glorie in the spreading of the Gospell. (Barlow 1597, A4v, B1v–B2)

Likewise, three decades later William Bedwell asked rhetorically: "some will aske, Why I being a Divine, should meddle or busie my selfe with these prophane studies? Geometry may no way further Divinity, and therefore is no fit study for a Divine?" Such an argument, Bedwell sneered, "seemeth to smell of Brownisme, that is, of a ranke peevish humour overflowing the stomach of some, whereby they are caused to loath all manner of solid learning." Further to defend himself, he proceeded to enumerate the many benefits that the various branches of learning, including mathematics, render unto divinity (Bedwell 1636, A5). Bedwell had good reason to be cautious. As early as 1605, while rector of St Ethelburgha, Bishopsgate, he charged two of his parishioners for slandering him by claiming, among other things, that he had "evade[d] divine services." The commissioners investigating the case, however, found against him and concluded in 1606 that he, indeed, had not "attended his calling" (Hamilton 1985, 18). Not that Bedwell had spent his time only on scientific studies. He was equally avid in his pursuit of Arabic. Moreover, the 1605 incident occurred while he was serving as one of the translators of the King James version of the Bible. Nevertheless, Bedwell became sensitized to such allegations and henceforth his scientific publications included justifications – either that he was simply acting on behalf of his dead uncle Thomas Bedwell, whose reputation William was trying to protect through publication, or that he was acting out of Christian charity by publishing practical books tending to the public good. Understandably, John Clerke, the editor of the posthumous *Via Regia ad Geometriam*, added his own defense of the

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propriety of Bedwell's publication, stating that this enlarged rendering of Ramus into English was intended "not for the deepe and Judiciall, but for the shallowest skull, the good and profit of the simpler sort, who as it was in the Latine, were able to get little or no benefite from it" (Bedwell 1636, A3 ^{v}).

At the turn of the eighteenth century, clerics with the itch for publication continued to be apologetic. William Derham prefixed only his initials to the title page of his first book, *Artificial Clock-Maker*, justifying its publication by insisting that the book "was written only as the harmless . . . sport of leisure hours; [and] I think my self excusable to God and to the World, for the expence of so much time, in a subject different from my Profession." He further alleged it to be a work of charity benefiting the public (Derham 1696 A2-A2 ^{v}). A quarter of a century later Derham was still anxious about how his activities were perceived by contemporaries, and to this end he inserted into the preface to his edition of Hooke's works the following caveat: "And as for the Diversity of this from the Business of my Profession: I confess it is not direct Divinity, but yet I think it, by no means, unfit for a Clergyman's Diversion . . . what Diversion [is] more innocent, or proper, than that which promotes Knowledge, and Experience, and is a Discovery (if never so small) of any of the Works of the infinite Creator?" (Hooke 1967, A4 ^{v}).

Perhaps the best example, and one well worth dwelling on, of the seeming incongruity between ministerial calling and scientific avocation is the one posed by William Oughtred. Having been educated in Cambridge where he quickly gained a reputation for his mathematical talents, Oughtred accepted a comfortable living not far from London. There he devoted much of his time to his own studies and to instructing young, talented, mathematicians who came seeking his advice at the expense, it seems, of the spiritual needs of his parishioners. Like other clerical practitioners, Oughtred had no intention of publishing his works, save for a brief anonymous note on logarithms he contributed to the 1618 edition of Edward Wright's translation of Napier's *Mirifici Logarithmorum Canonis Descriptio*. He consented to the publication of his famous *Clavis* in 1631 only under pressure, and because it could be justified as representing the manual by which he instructed the young son of the Earl of Arundel. However, Oughtred was willing to allow his students to avail themselves of certain of his works and instruments so long as they did not mention him by name. Such was the case in 1632 when William Forster translated and published Oughtred's description of his Horizontal Dial. The book caused an immediate priority dispute with another former pupil of Oughtred, Richard Delamain, who not only accused Oughtred of falsely taking credit for the invention of the instrument but, far more pernicious from Oughtred's point of view, lashed out that Oughtred's devotion to mathematics gave occasion to the dereliction of his ministerial duties. His writing plans would have been different, claimed Delamain, "had I not beene prevented by some others, whose calling might have invited them to spend their hours better, than to snatch with greedinesse that out of anothers hand which was not their owne" (Delamain 1633, A ^{v}).

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Deeply offended and alarmed at such a charge, Oughtred immediately rushed into print with a lengthy *apologia pro vita sua* in which, more than attempting to safeguard his priority and contrast his philosophy of mathematics with that of Delamain, he was anxious to vindicate his character and the propriety of his conduct. "While he was ridiculous and vaine in his opprobries, I dallyed with him," began Oughtred. But Delamain's "taxing me of want of charity, in refusing peace sought, and prosecuting contention and discord, contrary to my Christian duty, pierceth to the quicke," while his slanders and lies "cuttest like a sharpe razor!" – especially as Delamain seems to have circulated his charges widely among members of the upper class, clergymen, and even the Bishop of London. After dwelling on the scandalous allegation that the pursuit of mathematics and good learning in general was unbecoming to a divine, Oughtred continued: "he upbraideth me for *taking libertie enough to the losse of time: and neglecting my calling*. I must confesse this scandall cutteth deepe: and hath with them, to whom I am knowne, wrought me much prejudice and disadvantage." To counter such calumnies, Oughtred felt compelled to narrate the course of his life. Even while at Cambridge, he pointed out, he had pursued his mathematical studies only "over and above those usuall studies," and "redeemed night by night from my naturall sleep, defrauding my body, and inuring it to watching, cold, and labour, while most others took their rest." Furthermore, he shared his knowledge freely with students throughout Cambridge. Such a course he continued during the ensuing three decades, so that "whether *I have taken so much liberty to the losse of time, and the neglect of my calling*, the whole Countrey thereabouts, both Gentry and others, to whom I am full well knowne, will quickely informe him." All his secular studies, Oughtred insisted, served merely as "recreations." For "as oft as I was toyled with the labour of my owne profession, I have allayed that tediousnesse by walking in the pleasant and more then Elysian fields of the diverse and various parts of humane learning, and not of the Mathematics onely" (Oughtred 1633a; emphasis in original).

Oughtred remained deeply sensitive to the issue. When consenting in the same year to the publication of a short treatise on gauging – for the benefit of practitioners, of course – Oughtred, anticipating censure, reiterated his position concerning the propriety of a divine's engagement in mathematical studies:

> in respect of my particular calling: of the height and dignity whereof, such small and low cogitations may seeme to be unworthy. But may it please them to consider, that Theologie is . . . the chiefe and principall Lady and Mistresse of all other faculties; unto which all callings in this life, for their just, faithful, and conscionable execution, are to comply, and bee accountable . . . . If I therefore by the helpe of God, and the knowledge hee hath beene pleased to give me, shall exhibite unto this renowned Citie, a line and a rule to measure vessels with according to true art, and shall teach how to reforme an errour, which hath for some time (through ignorance of better) usurped the place of truth; and that with much more facility, then it is committed: I hope I shall not justly be thought to wander out of the limits of my profession and calling. (Oughtred 1633b, 1–3)

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Yet Oughtred's position remained insecure. With the outbreak of the Civil War he was nearly deprived of his living following his parishioners' – and even local ministers' – complaints that he was "a pitiful preacher" having "bent all his thoughts on the mathematiques." Only thanks to the timely intervention of the astrologer William Lilly on his behalf was the venerable mathematician allowed to keep his position. Miraculously, Oughtred also discovered his talents as a preacher (Aubrey 1898, 2:111; Lilly 1974). The feelings of the beleaguered mathematician were forcefully articulated in a letter Oughtred wrote in 1642 to a stranger who requested his assistance in solving a certain mathematical problem:

> It is true that I have bestowed such vacant time, as I could gain from the study of divinity (which is my calling,) upon human knowledges, and, amongst other, upon the mathematics . . . . But now being in years and mindful of mine end, and having paid dearly for my former delights both in my health and state, besides the prejudice of such, who not considering what incessant labour may produce, reckon so much wanting unto me in my proper calling, as they think I have acquired in other sciences; by which opinion (not of the vulgar only) I have suffered both disrespect, and also hinderance in some small perferments I have aimed at. I have therefore now learned to spare myself, and am not willing to descend again *in arenam*, and to serve such ungrateful muses. (Rigaud 1841, 1:60–61)

The previous examples conjure the lot of clerical practitioners whose scientific avocations were perceived (by themselves or by others) to have at least raised a semblance of impropriety when judged by accepted norms. Similar conclusions may be drawn from the pronouncements of practitioners who, though not engaged at the time in the cure of souls, nonetheless considered their proper calling to be that of theology and, consequently, exhibited like sensibilities. In March 1678, for example, John Ray declined the position of Secretary of the Royal Society, "chiefly [for] its inconsistency with my profession." Such a response led John Aubrey to the mistaken assumption that Ray was considering selling his scientific books. Ray's response is telling: "True it is Sir, that Divinity is my Profession, yet not lately by me undertaken, but before I left the University, which is now more than 16 years agoe. The study of plants I never lookt upon as my businesse more than I doe now, but my diversion only; which yet since I am not qualified to serve God and my generation in my proper function, I have been more bold to bestow a good proportion of my time on" (Ray 1928, 163, 159).[3]

Even more revealing is the career of Isaac Barrow, whose heart had always been set on pursuing divinity as his calling. Unfortunately, his Royalist sympathies during the

[3] In 1691 Ray finally found the means by which to resume his vocation. As he announced in the preface to *The Wisdom of God*, "By Vertue of my Function I suspect my self to be obliged to Write something in Divinity, having Written so much on other Subjects: For being not permitted to serve the Church with my Tongue in Preaching, I know not but it may be my Duty to serve it with my Hand by Writing. And I have made choice of this Subject as thinking my self best qualified to Treat it" (Ray 1691, A6).

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civil war put a halt to such aspirations and caused him to pursue mathematics and medicine instead. However, no sooner was Charles II restored to the throne than Barrow's original design to profess theology was revived, so much so that none of his "secular" rewards – the Regius Professorship of Greek, Gresham Professorship of Geometry, and Lucasian chair of mathematics – could assuage his yearning for what he considered his true calling. An inkling of his anxiety can be gleaned from Barrow's cover letter to the future Archbishop John Tillotson, when he presented the latter with a copy of his *Lectiones geometricae* in 1670: "While you, dear man, expound to the people the mysteries of sacred truth, closing the mouths of petulant sophists and, at the same time, waging successful war on behalf of God's law; lo, I am tied miserably to these hooks which you see, wasting my time and intellect. The explanation of my hard lot is manifest, but I will be modest about this unwanted Offspring." When Barrow finally achieved his goal and was made the King's chaplain, he made public his intent to turn a new leaf: he announced his abandonment of the study of mathematics as well as his resignation of the Lucasian chair in favor of Isaac Newton. As Abraham Hill, his friend and first biographer, put it, Barrow "was afraid, as a clergyman, of spending too much time upon Mathematics; for . . . he had vowed at his ordination to serve God in the Gospel of his Son, and he could not make a bible out of his Euclid, or a pulpit out of his mathematical chair" (Feingold 1990, 80–1).

Public renunciation of secular learning in favor of divinity was not new, of course, as the above noted examples by Lyly, Addison, and Donne make clear. Those engaged in mathematical and philosophical studies did the same. Cuthbert Tunstall's appointment in 1522 as Bishop of London, for example, coincided with the publication of his influential *De Arte Supputandi* and in his dedication to Sir Thomas More, the newly elected Bishop declared that although he had devoted a great deal of time and labor to the book, now he "not only resolved that [he] would devote what [was] left of [his] life to sacred literature, putting all worldly writings entirely aside," but even considered destroying his papers, because he did not think it "right that any part of [his] life should for the future be filched from sacred studies to polish them up." Only consideration of their being of some value prevented him from committing "to the flames and destroy what remained to [him] from the labour of so many nights" (Sturge 1938, 73). More than a century later Henry Peacham made an even more dramatic public valediction: "I confess I have spent too many hours in this folly and fruitless exercise, having ever been naturally addicted to those arts and sciences which consist of proportion and number, as painting, music, and poetry, and the mathematical sciences. But now, having shaken hands with those vanities, being exercised in another calling, I bid them (though unwillingly and as friends do at parting with some reluctancy) adieu, and am with Horace his old censor forced to say, 'Veianius hangs up his arms at Hercules' door and then lies hidden in the country' " (Peacham 1962, 192).

Nor was Barrow's belated embarkation on his preferred vocation as a divine unique in seventeenth-century England. Indeed, the efflorescence of scientific activity during the middle years of the century may be attributed to momentous shifts in

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career trajectories. The two "founders" of the Oxford Club, for example, Ralph Bathurst and Thomas Willis, were both frustrated in their wishes to become divines, as was Seth Ward, Savilian Professor of Astronomy. John Wallis, who expected from an early age to become a divine, rediscovered the mathematical sciences while Secretary to the Assembly of Divines, and in view of the course in which the country was headed, took up again that which had previously been his diversion. Equally relieved to return to academic (and scientific) pursuits was John Wilkins, who had served as chaplain to several grandees before returning to Oxford in 1648. Following the Restoration several, like Seth Ward and, to a lesser extent, Wilkins, resumed their original direction. But for others it proved too late. As Bathurst wrote Ward in 1664, "And surely I should soone begin to frame my thoughts thereto, if I had but something that might make a tolerable recompence for what I gaine by my present practice; which though it be no more than will serve for a livelihood, (as indeed I never desired to have it, being only my refuge in bad times, and not my primitive designe,) yet I perceive it began to be sensibly diminished upon the very report of my purpose to professe divinity." His biographer added that he never pursued some of the theological subjects he mentioned as "his long and total attachment to philosophical pursuits seems to have entirely alienated his mind from divinity; at least, to have extinguished all hopes and ambition of succeeding in a study which he had so long neglected" (Bathurst 1761, 54–9, 204–6). Bathurst's close friend and mentor in medical studies, Thomas Willis, traversed a similar trajectory. By the time he graduated MA in 1642, Willis had already "some thoughts of choosing divinity for his profession." But his father's death forced him to return home and settle the estate until the advancing parliamentary forces sent him back to Oxford to seek protection. Then, "having seen the constitution of the church overturned, and no encouragement left for the study of divinity, he turned his thoughts to physic." Analogous to the way Bathurst assisted Bishop Skinner, so, too, Willis, a "zealous son of the Church of England" had "prayers and sacraments daily performed at his chambers" in which most loyalists participated. By the Restoration, however, Willis, unlike Bathurst, deemed it too late to change his calling (Willis 1679, A3^{v}-A4; Kippis 1747–66, 6 (2):4292).

The case of Willis and Bathurst attests to medicine, too, as a secular pursuit at odds with clerical status. True, medicine was often the profession to which clerics who were prevented from practicing their proper calling reverted. William Turner became a physician and botanist while a religious exile on the Continent (c. 1540–1547), and his studies and practice continued during his second exile (1553–1558) as well as after he had been removed from his position as Dean of Wales for non-conformity. His younger contemporary, Thomas Penny, got into trouble in 1565 over a sermon he had delivered, and he, too, turned to medicine and botany (Raven 1947, 48–137, 153–71; Jones 1988). Many Puritans followed their example before the Civil War. Richard Capel, for example, anticipating deprivation in 1633 for refusing to read the Book of Sports in his church, resigned his living and received a license from the Bishop

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of Gloucester to practice medicine. As his biographer put it, "His studies had bent that way before hand (foreseeing what followed) yet he would do nothing in that kinde, (it not being his Calling) so long as that great Work lay upon him: But when he had quit that more special Tie of the Care of mens Soules, He took himself then to be at more freedome; and (upon a Licence sent him by one that might authorize him) he fell upon the cure of mens bodies" (Capel 1658, A13). Conversely, following the ascendancy of Puritanism into power, it became the turn of Royalist divines to at the very least contemplate embarking on a medical profession. Among those tempted, in addition to Bathurst and Willis, were Herbert Thorndike and the future archbishop William Sancroft (Thorndike 1844–56, 6:129–3).

Practicing divines, however, were as susceptible as clerical mathematicians to experiencing inner doubts or facing external disapprobation – notwithstanding the oft-voiced justification that their duty was to care for the physical as well as spiritual well-being of their flock. Examples of medical clerics who attempted to resolve problems of conscience and propriety abound, particularly when venturing into print. Those cavilers who claimed "that a matter of Physick is no fit argument for a Divine to handle" – Nicholas Gyer argued in 1592 – should consider the example of such eminent medical clerics as William Turner and Thomas Penny. Indeed, he continued, "the Divine and the Phisition work upon one subject, they assemble themselves in one place, vz. the chamber of the sick." Hence Gyer felt that his modest foray into phlebotomy was lawful: "For my owne parte I am fully perswaded in mine owne conscience (think or say others what they list) that I have done more good to the Church of God and common wealth of this land, in this simple translation or collection . . . then divers dogged Divines of this age" (Gyer 1592, A7-A7^{v}). A decade later Simon Harvard felt a similar compulsion to "answere certaine doubts and occasions of offences which perhaps might arise upon the publishing" of his treatise on phlebotomy:

> First therefore if any (because I having heretofore committed to the presse certaine Sermons, and matters of Divinity, do now begin to set forth a Physick worke) do therefore gather or suspect that I have converted my studies from the scriptures unto Galen, let him know that in this point I am utterly mistaken by him, for most of my physick observations were then collected when first I gave my mind that way, which was long before I published any matter of Divinity: so that if there have bin any alteration or conversion or studies, it hath bin from the perusing of Physick auctors to the reading of writers wholly theologicall. And yet still (the conjunction betwixt the body and soule being so neare, and the sympathy so great) I see no cause but that he which studieth Divinity, may lawfully now and then so bestow a spare houre in viewing of the remedyes ordeyned by God for man infirmities. (Harvard 1601, A6 v-A7)

Thomas Tymme, in turn, anticipated the charge "that I am out of my element, in that I being a professed Divine, should [not] take upon me to meddle with Physicke," by retorting "that a generalitie in humane learning, beseemeth a Divine: and of all

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Sciences none more sutable to profession than Physick." After citing several religious authorities condoning involvement in healing, he concluded: "As for the time Which I have spent herein, it is my gaine: happily extracted from idle time, whereas otherwise for my recreation, I might unhappily have done nothing: and yet have not neglected my pastorall function" (Du Chesne 1605, ⋆2; Harley 1998).

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Until now the secular pursuits of divines have been viewed as relatively unproblematic, both in terms of their own perceptions concerning the propriety of such activities and their conformity with approved societal norms. Implicit in such a view is the assumption that the means by which a cleric gained his livelihood was incidental to his scholarly activities; one could be a mathematician (or poet or historian) who happened to be a cleric as opposed to a physician, a lawyer, or courtier. However, as the cumulative evidence suggests, reality was never so simple. Like their physician and lawyer counterparts, university divines and country ministers might have made time to pursue their secular studies. But while the former were not the least constrained to keep within the bounds of their respective professions in their pursuit of erudition, divines were. And how! Not that clerics never became serious students of secular studies; as I showed above, many of them *did*, as their passion for learning was simply too ingrained to be undone by ordination. My contention instead is that norms governing the propriety of ministerial duties – shared by all English Protestants – informed their expectations vis-à-vis the direction of their energies and the medium for its channelling. And while this did not necessitate the renunciation of secular learning, it undoubtedly brought a whole new set of expectations to bear on the proper purview of its deployment. Certainly, one was not expected to make a name for oneself as a critic, or a poet, or an astronomer. However, since poets and astronomers, if not critics, were made well ahead of ordination, this drastic reorientation often brought with it, as I have tried to chronicle, a psychological crisis whose outcome was far from certain. Those unable to forsake their cherished secular studies almost invariably "internalized" them, thereby achieving a spiritual compromise of sorts – relegating passion to leisure hours, without benefit of gain or fame, and circumventing the disapprobation of their peers.

The determination of many practitioners to keep their studies private – so that the "world should not know how they had spent the greatest part of their time," to paraphrase Edward Davenant – and the almost inevitable dispersal of their papers following their deaths have no doubt contributed to the prevailing historiographical misconception regarding their failure to make a "positive" contribution to contemporary science. Such a misconception, in turn, licensed their omission from historical narratives and generated a rather lopsided view of the size and nature of the English scientific community in the early modern period; ultimately, it led to the widespread assumption – based on an almost exclusive focus on London's "public"

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science – concerning the practical orientation of English science.[4] Analogously, ignoring (or unaware of) the complex context within which some of these practitioners produced their texts, historians have concluded that such works attest to a religious motivation behind the study of nature. The claim has found various articulations. According to Perry Miller, "Science was not merely tolerated because faith was believed to be secure whatever physics or astronomy might teach, but it was actually advanced as a part of faith itself, a positive declaration of the will of God, a necessary and indispensable complement to Biblical revelation" (Miller 1970, 211). For his part, Charles Webster insisted on the need to regard the "personal testimonies" of scientists "as more than token gestures toward the reconciliation of science and religion. Such testimony unambiguously suggests that Puritans believed their motivation toward science derived from religious sources" (Webster 1986, 203). More specifically, Charles Raven was convinced that "the same motives which made [William] Turner a Gospeller, [also] made him a Herbarist" (Raven 1947, 70), while William Fulke was said to have resolved "to his own satisfaction . . . any question of a conflict between science and religion. The glory of God could be seen in the study of the natural creation, and the pattern of causation in a divinely ordered universe was as knowable to the scientist as the pattern of revealed truth was to the theologian" (Bauckham 1975, 19–20).

Such claims can be traced back, of course, to one of Robert Merton's central theses in his influential *Science, Technology and Society in Seventeenth Century England*: namely that what motivated most prominent English practitioners to pursue science was the ideal of "intramundane asceticism" (Merton 1970, 55–92). However, as Abraham pointed out, while Merton cited statements "to the effect that science affords a means of confirming the majesty of the deity, of seeing for oneself the hand of God in nature, and so forth," no scientist "is presented as ever having said that this was what motivated him, either to take up science or to make a particular discovery." Hence, Abraham concluded,

> The publicist arguments from design, arguments for scientific activity as a field for the legitimate glorification of God, and arguments for the quality of performance in a vocation (which is especially evident, it was argued, in science) as a sign of salvation – all these are nonetheless important. Only they cannot be cast as motives for doing science. They doubtless acted on the popular religious mind as *motives for accepting those who did do science*. (Abraham 1983, 371–2; emphasis in original)

To impute religious motivation to science proved to be easy. On the one hand, the scientific pursuits of many divines seemed sufficient proof for the harmonious coexistence of science and religion in the minds of practitioners. On the other hand, the pious pronouncements of such practitioners, apart from reinforcing for scholars the image of harmony, were also uncritically seized upon to denote motivation –

[4] I hope to address this topic elsewhere.

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rather than rationalization. Likewise, the temptation to read back into the seventeenth century clerical conditions and practices that became widespread only later led to an even greater distortion of the mindset of early modern practitioners and their milieu. To a certain extent the temptation went so far as to find in the writings of Calvin (and other reformers) the sanctioning of natural theology. Particular attention was given to such passages as the one early in the *Institutes*, wherein Calvin acknowledged that while no man was hindered by the lack of learning from admiring God's creation, "truly they that have digested, yea or but tasted the liberal arts, being holpen by the ayde thereof, doe proceede much further to looke into the secrets of Gods Wisedom." Understanding the position and motion of the heavenly bodies, he continued, "needeth art and an exacter diligence: by which being thoroughly perceived, as the providence of God is the more manifestly disclosed, so it is convenient, that the mind rise somewhat the higher thereby to behold his glorie" (Calvin 1587, 6–6^{v}). Elsewhere he suggested that "those who neglect the knowledge of God which may be attained through the study of his works are as guilty as those who, studying only the works, neglect the God who made them" (Calvin 1578, 18–20). Leaving aside that such scattered comments were far from central to Calvin's teaching, scientific knowledge within his schema may have been desirable – within limits – but surely not essential for either salvation or scriptural revelation (Kocher 1969, 9–10; Olson 1987, 8). Further to the point, neither Calvin nor his English disciples intended to render the injunction regarding the duty to contemplate God's creation as an invitation to make astronomy one's calling, certainly not for divines. As various scholars have pointed out, before the second half of the seventeenth century, few believed that the edifying language of certain Old Testament passages should be interpreted to mean that the knowledge of God could be inferred from nature. Nor did the rhetoric of traditional natural theology – stretching back to antiquity – comprise the most significant ingredients of what came to characterize the tradition of natural theology from Ray to Paley. I shall return to the new form below (Olson 1987; Gillispie 1987).

Cognizance of the crucial differences between the two expressions of natural theology, notwithstanding the similitude of language, cannot be over-emphasized. Before the mid-seventeenth century the traditional form of natural theology was wielded primarily as a shield to defend practitioners and their activities. Only later did it develop into an active principle of action. Hence, it becomes imperative not to allow similitude to determine the context of language and the motivation of its bearers. Pious rhetoric, especially on the part of divines, should be understood primarily as a rationalization of an activity that had been undertaken for its own sake during student days, and whose continuance clerical practitioners felt compelled to justify. Of course, I do not wish to imply that they did not believe their rhetoric, only that it was not the motivation for the activity. What modern scholars often overlook is the evidence of significant numbers of clerical practitioners who, in order to account for their absorption in scientific studies, had slowly developed during the

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sixteenth and early seventeenth centuries both the argument and the vocabulary that would become the parlance of eighteenth century natural theology. Thus, even George Hakewill, who was not a scientific practitioner but a pious divine whose 1627 *An Apologie or Declaration of the Power and Providence of God in the Government of the World* partly dealt with the natural world, was at pains to argue – as did numerous other divines venturing into secular studies – that the book was conceived as a private exercise. Only subsequently, "considering not onely the rarity of the subject, and variety of the matter, but withall that it made for the *redeeming of a captivated truth*, the *vindicating of God's glory*, the *advancement of learning, and the honour of the Christian and reformed Religion*," he decided "to make it publique for the publique good" – and then only after he had consulted men of the highest piety who encouraged publication. "Neither doe I take it to lie out of my *profession*," Hakewill continued, for "the principall marke which I ayme at throughout the whole body of the Discourse being an *Apologeticall defence of the power and providence of God*, his *truth*, his *justice*, his *goodness and mercy*, and besides, a great part of the booke it selfe is spent in pressing *Theologicall* reasons." His point is that he wrote the book while contemplating God and he believed that its content would help Protestants combat Catholicism. "If then," Hakewill concluded, "to make my party good, and to waite upon Divinity, I have called in subsidiary aydes . . . and if I have in imitation of [various Church Fathers] . . . endeavoured to cut the throates of the *Paynims* with their owne swords, and pierce them with their owne quils, I hope no learned man, or lover of Learning will censure me for this" (Hakewill 1635, B-B2; emphasis in original).

Hakewill's invoking of "subsidiary aydes" invites further reflection on the regulation of the proper boundaries of scientific investigation set down by Calvin and his English followers, especially for divines. To reiterate, the non-hostile attitude toward the study of nature was not a summons to zealously embrace it. Calvin admitted that astronomy "is useful to be known," and "as ingenious men are to be honoured who have expended useful labour on this subject, so they who have leisure and capacity ought not neglect this kind of exercise." But neither for him, nor for other reformers, was science an issue to be reckoned with, except when the need arose to interpret Scriptures – or to admonish excessive curiosity and the study of nature for its own sake. In other words, science was regarded as strictly an ancillary tool, to be studied and deployed only insofar as was necessary, and primarily in order to bolster faith (Calvin 1948, 1:86–7; Dillenberger 1988, 33–5). Such broad principles continued to inform Calvinist divines well into the seventeenth century. Consequently, when the Presbyterian Richard Baxter laid down the order of studies recommended for students, he did not ascribe mathematics "a prominent place," as Merton argues, but rather advised them to "take in as much of the mathematics as their more necessary studies will allow them time for; (still valuing knowledge according to the various degrees of usefulness)." As for natural philosophy, Baxter likewise insisted on the traditional subordination of the discipline to a higher purpose: "When you come to seek after more abstruse and real wisdom, join together the study of physics and theology; and take not your physics as separated from or

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independent on theology, but as the study of God in his works, and of his works as leading to himself." As was the case with mathematics, however, the knowledge "of the works of God" must be carried out "according to the usefulness of each part to your moral duty; and as all are related to God and to you" (Merton 1970, 69; Baxter 1825, 4:577–8). At least outwardly, Baxter's sentiments were shared by his high-Churchman contemporary Meric Casaubon, judging by the latter's 1659 apology for having "been somewhat curious for one of my Calling, that had no other end but to attain to some Knowledge of Nature, without which a man may quickly be lead into manifold delusions and Impostures." However, Casaubon justified such a pursuit on the grounds that "we have to do with them especially who by their Profession pretend to the Knowledge of Nature above other men" (Casaubon 1659, B4).

The injunction that divines keep the pursuit of ancillary studies within proper bounds was not restricted to the domain of science. The bitter debates during the 1640s and 1650s over the role of profane learning in the training of the ministry – which threatened the very existence of Oxford and Cambridge – are illuminating in that none of the numerous defenders of humane learning came even close to advocating the study of philology, philosophy, or the arts for their own sake. In the domain of erudition, therefore, conscience and perception of calling combined with the laws of patronage and the state of affairs at the universities to mandate that the extensive philological learning of English scholars either remain private or be employed within the confines of theological pursuits. Their scholarship was to be a matter of reputation rather than of publication. As early as 1613 Hugo Grotius discerned such a state of affairs – and proceeded to demean it: "I came from England where there is little commerce of letters; theologians are there the reigning authorities. Casaubon is the only exception; and he could have found no place in England as a man of learning; he was compelled to assume the theologian" (Pattison 1970, 286; Feingold 1995). Indeed, one may detect a pattern whereby a learned master of arts in his twenties tried his hand at classical scholarship, only to abandon the field shortly thereafter in order to dedicate his life to theology. Such was the case with the learned editor of Lycophron (1697) and the author of *The Antiquities of Greece* (1697–8), John Potter (MA 1694). In his preface to Lycophron, he "announced his intention of devoting himself in future to theological study and to the service of the church." In 1707 he declined the professorship of Greek on the grounds that he had "turned his study wholly to divinity" (Clarke 1986, 532 n. 3; Ward 1958, 32). A century earlier John Rainolds announced that he had resigned his Greek lectureship at Corpus Christi College, Oxford, so that he "might the better apply the studie of divinitie." Unlike Potter, however, he refused to publish his celebrated orations first, "partly through bashfulnes, least any man should thinke me to hunt after glory, which yong men are too greedy of" (Rainolds 1588, 594–5).

Publication, indeed, often proved the shibboleth revelatory of the attitude toward both secular studies and fame. John Wilkins' publishing career tells us a great deal about the frame of mind of a key figure in the development of the new English

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natural theology concerning the propriety of publishing outside his calling. Graduating MA in 1634 and ordained priest in February 1638, Wilkins published shortly thereafter – and anonymously – *The Discovery of a World in the Moone*. In an unsigned preface he warned the reader not to expect much from a book which was "but the fruit of some lighter studies, and those too huddled up in a short time" (Shapiro 1969, 257; Wilkins 1638, A3 ^{v}). A companion volume, *A Discourse Concerning a New Planet*, was published two years later, also anonymously. Only slightly more acknowledgment of authorship appeared in *Mercury* (1641), wherein Wilkins deemed it necessary to append his initials to the dedication to George Lord Berkley. He offered the book to his patron as "the fruit of my leasure studies, as a testimony of my readinesse to serve you, in those sacred matters, to which I devote my more serious houres" (Wilkins, 1641, A3). And though the dedication of *Mathematicall Magick* (1648) to Charles Louis, Elector Palatine was signed, he was careful to characterize the book as "diversions," a discourse "composed some years since at my spare howers in the University" (Wilkins 1648, A4-A4 ^{v}). Only *Ecclesiastes, or A Discourse Concerning the Gift of Preaching* (1646) bears his name prominently on the title page, testimony to his valuation that it was proper to acknowledge authorship of such an edifying treatise.

The only book published by Wilkins after the Restoration was *An Essay Towards A Real Character and a Philosophical Language*. It was "his darling," Aubrey wrote, "and nothing troubled him so much when he dyed, as that he had not completed it" (Aubrey 1898, 2:302). The book on which Wilkins worked so long was published in 1668, four years before his death, and if it was not completed to his own satisfaction it was because it was rushed into print ahead of his installation into a bishopric. The dedication to Viscount William Brouncker, President of the Royal Society, included the appropriate justifications – the book was published at the urging of the Society and for the benefit of religion and society. However, directly contradicting Aubrey's account was that of a friend of Wilkins who claimed that on his deathbed the latter "regarded not his *Universal Character*, which had much empaired his Health; but when spoken to about a *Latin Version* of it, desired not to be troubled about it, professing his Comfort and Joy, that since his Promotion to *Chester*, he had encouraged and furthered *Preaching of Christ*" (Trench 1693, 33–4).

Wilkins' determination to remain within traditional bounds of ministerial conduct vis-à-vis secular pursuits demonstrates the extent to which even such a central figure of English scientific life during the second half of the seventeenth century – not to say one who helped forge a new mindset that eventually allowed greater scope and legitimacy for a cleric to study nature – still remained bound to earlier conceptions of propriety. True, his *Principles and Duties of Natural Religion* (1675) was a posthumous work, but Wilkins had been struggling with the issues therein discussed ever since his first foray into print. The same resolve can be detected in the careers of those who labored alongside him in forging a new natural theology – virtually all of whom, it should be emphasized, were cleric practitioners who traversed the same tortuous road

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as Wilkins – Henry More, John Ray, Benjamin Whichcote, Seth Ward, and Ralph Cudworth. The foundations for the new doctrine were laid down in the 1650s, a date not at all coincidental: A confluence of religious and intellectual events – the abolition of Episcopacy, the erosion of the Calvinist consensus, the perceived rise of enthusiasm and atheism, the diffusion of Cartesian and Gassendist ideas, and the impact of Hobbes – presented our clerical practitioners with the opportunity to resolve their private crises of vocation while simultaneously taking effective measures to combat unbelief and transcend contemporary divisive religious polemics. They found their scientific practices to be the infusion necessary to resuscitate traditional natural theology, whose readily available language could now be sharpened and re-deployed toward different ends.

The new natural religion did not transform the relations of science and religion in England overnight. For a long time, old and new ideals regarding the propriety of a dual vocation of cleric and scientific practitioner conflicted. Even for William Derham, one of the key figures in developing "Physico-theology," the traditional apologetic formula had not become redundant. We noted earlier his vigilance to account for his learned forays, which he maintained even when publishing his celebrated Boyle lectures. Like Hakewill nearly a century earlier, Derham prudently informed the readers of *Physico-Theology* – the subtitle of which closely echoes Hakewill's – that his original thoughts about the subject were "rather the diverting Exercises of my *Leisure Hours*, than more serious *Theological Studies*." He had turned his attention this way because as a divine, as well as FRS, he was "minded to try what [he] could do towards the Improvement of *Philosophical* Matters to *Theological* Uses," and even then he had no intention of publishing his sermons before Archbishop Tenison appointed him Boyle lecturer (Derham 1727, "Dedication"; emphasis in original). Quite instructive is to contrast Derham's cautious remarks with the full blown apologia that his 1798 biographer prepared for him: If a clergyman associates "the Knowledge of Nature . . . with the perfections and attributes of that wonderful Being who framed those laws," the biographer insisted, "he deviates not in any respect from his professional duties, but is, on the contrary, a most useful labourer in the vineyard of his heavenly Master" (Atkinson 1952, 389).

While this paper focuses on the English experience, I would like to suggest that the predicament involving the propriety of clerics' sustained preoccupation with science was shared by Catholics as well as Protestants. True, important doctrinal, social, and institutional conditions differentiated Catholics from Calvinists (or Lutherans). Nevertheless, Catholic clerics were as prone as their Protestant contemporaries to inner qualms regarding the inordinate pursuit of secular learning – and as likely to be reproached by colleagues and superiors. Equally important, while the collegiate structure of Oxford and Cambridge had no counterpart in Continental universities, members of Catholic religious Orders in particular lived under not dissimilar conditions. Three examples must here suffice. Like many young Protestant scholar-divines, the abbé Prévost experienced a painful period of soul-searching when he was

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required to chose between a learned and religious calling. As he wrote shortly after he was professed:

> I know the weakness of my heart, 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 would still have great power to allure me, although they are half blotted out. (Prevost 1972, 15; McManners 1998, 1:607)

Prevost's subsequent career fully substantiates his weakness. Yet important to bear in mind is the relevance of the sentiments he expressed – and which were quite common – to career choices, to decisions about what course of study to follow, and to publication. And while the Catholic Church proved to be more hospitable to clerics who pursued secular learning, neither practitioners nor contemporary observers assumed membership in a religious Order or acceptance of a Church position as unproblematic. Fontenelle articulated the position in his éloge, where he approvingly recounted the astronomer's decline of various positions the Pope offered him if he became a cleric: "In Italy a learned ecclesiastic can reach so high a position he thinks nothing is above him; there is no other situation likely to provide such great rewards; but Cassini did not feel a calling, and the same piety that made him worthy of entering the Church kept him from it" (Heilbron 1999, 82–3). Facing death, too, Catholics tended to reflect on their former lives with a trepidation certainly equal to that of Protestants. Toward the end of his life the Jesuit Francisco Suarez, like the Puritan Nathanael Carpenter in England a generation later, contemplated the futility of his career as a scholar and sought to devote the remainder of his life to prayers and contemplation. His Rector attempted to console him, saying "that these great talents of his clearly demonstrated what God wished him to do, that his vocation was to defend and explain the truths of Catholicism, [and] that his previous works and successes obliged him to continue in the same way to the end" (Fichter 1940, 328–9).

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