The Invention of Discovery, 1500–1700 edited by James Dougal Fleming

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For historians of science, the age of discovery seems to have receded into the shadows, replaced by an early modern period pulsing with inventions and inventors, a landscape in which the social and cultural construction of newness in the world loomed large for natural philosophy, technology, and even the arts. The inevitable quotation marks surrounding the 'discovery' of the Americas are only the most visible (and surely the most justified) signal of this shift. Coincident with this now entrenched recognition of discovery's cultural chauvinism has been a growing awareness of invention's purchase as a rhetorical model and practical goal for early modern philosophers, historians, poets, painters, and travelers alike. The boundary between that which awaited unveiling and that which must be fabricated or conjured, a divide held fast at least in the modern vernacular imagination, appears in early modern Europe remarkably slippery and permeable. Given how firmly this revisionist conception has taken hold (for academics, if not for a larger reading public whose interest in feats of discovery remains unquenched), its own reappraisal is both welcome and overdue. James Dougal Fleming's *The Invention of Discovery* aims to problematize the hegemony of the invention paradigm not only within the history of science but across a wide swath of early modern disciplines and activities.

Fleming's volume revisits these entwined concepts with an observation and an ambitious structuring challenge. The rubric of discovery which we have treated with great scepticism was both prevalent and unshakeable in early modern Europe (as prevalent, indeed, as that of invention). In light of this fact, Fleming asks his contributors to

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turn their attention to the ways in which the very concept of discovery was itself one of early modern Europe's most potent inventions. More than just a witty turn of phrase, 'the invention of discovery' represents a recognition of the rubric's conceptual emergence and its rapid acquisition of tenacious strength in early science. Crucially, Fleming's introduction and afterword insist that this is not merely a historicist challenge (or at least not a problem that pure historicism can solve) but is also hermeneutic in nature. For the editor,

> the issue before us is not just how to understand a given historical object...but how to understand, *kurz*. [186]

The history of early modern science is, for Fleming, a hermeneutic project not least because we seek precisely to understand models of understanding.

In reevaluating these hermeneutic alternatives, the volume's 11 essays provide fruitful rumination on discoveries and inventions in a variety of fields and in a number of distinct early modern moments. Topics discussed range from the pure philosophy of Francis Bacon to the poetics of John Donne and from the introduction of the printing press in France to the staging of John Fletcher's *Knight of Malta* (1617). The chronological and geographic sweep of these essays, taking in Quattrocento Florence, Elizabethan England, and even colonial North America, amply justify the broad appellation of 'early modern' and this breadth exemplifies the spirit of Ashgate's series, Literary and Scientific Cultures of Early Modernity.

The Invention of Discovery's strongest essays shed new light on components of early modern knowledge formation that we often think we understand well, restaging acts of discovery and invention for contemporary readers. Fleming's own contribution, 'The Undiscoverable Country', provides the most sensible account of 'occult qualities'—a perennial bugbear for historians of science and the new philosophy—currently available. Fleming deftly extricates these scholastic phenomena from those theories of influence and affinity (including their Neoplatonic and Paracelsian versions) to which they have seemed closely bound. Though the occult qualities or properties of objects have often been designated as 'unknown', Fleming shows that they were instead 'unknowable' for some early modern thinkers. While we are familiar with the former as the assumed object of normal science, prophetic revelation, and magic alike, the latter proves a

fascinating (and to most readers now alien) component of scholastic knowledge—that which cannot be revealed, which indeed it is folly to investigate. Much of the success of this essay lies in Fleming's careful attention to the contours of these oft-parodied scholastic and Aristotelian modes of inquiry, a deep engagement that characterizes other recent works including Lodi Nauta's reevaluation [2009] of Lorenzo Valla's engagement with that legacy. Fleming also explores the relationship between secrecy and the occult within competing and collaborating systems of thought divided along the lines between scholasticism, the new philosophy, and esotericism. Horatio's imaginary response to Hamlet's rumination on the things of heaven and earth [69] both inspired this reviewer to laugh and brilliantly illuminated the point at hand—the too-often unexplored divide between the unknown and the unknowable. For Fleming, the very idea of discovery, the successful probing of the unknown, is revealed as one of early modernity's most powerful inventions.

Anthony Russell's exploration of the vital forces of early modern genius (and especially of poetry) surprises the reader by probing the reliance of John Donne's *Anniversaries* (1611–1612) on Ficinian ideas of creation (through the unlikely mediators of Campanella and Antonio Persio). Russell draws from an impressive range of scholarship including that on developing notions of genius in early modern visual art, embracing an interdisciplinary approach to invention that produces novel conclusions from well-studied material. The disenchantment of the world described so memorably by Donne (ostensibly on account of Elizabeth Drury's early death) is here turned on its head. While we tend to read *The Anatomy of the World*'s claim that 'The art is lost, and correspondence too' as a nostalgic lament, Russell instead finds in Donne's verse a call to action and a recognition of the powers of poetry and genius to re-enchant. Thus,

> as Campanella sees poetic utterance as having the unique power to pluck at the chords of life and generation, so Donne affirms the generative power of his verses.... What the poet dis-covers, through the inventive activity that produces his poem, is the redemptive creative energy that makes such invention possible. [92]

The move from Campanella to Donne is both unexpected and precisely the kind of thinking that a volume like this can foster at its best.

Unconstrained by the frequent boxing of Ficino into the study of 15th-century Neoplatonism, Donne's relegation to studies of poetics and literary biography, or Campanella's usual assignment to esotericism, Russell draws powerful connections between traditions habitually (if often informally) separated.

Indeed the volume's genuine interdisciplinarity is one of its evident strengths. Both Jacqueline Wernimont's discussion of Descartes' *The World* and Piers Brown's treatment of travel narrative and astronomy carve out welcome space for the porousness of literary, mathematical, and philosophical modes of writing. Perhaps the best example of this admirable interdisciplinarity is the fruitful joining by several contributors of studies of theology with histories of the new philosophy or science. Ryan Netzley's 'Numbering Martyrs' explores Protestant martyrology and investigates what terms like discovery and invention might have meant in a context traditionally far removed from the debates of early science. The links drawn between natural-philosophical invention and John Foxe's conception of immanent events are perhaps best appreciated by scholars already well-versed in English theology. Netzley's overarching claim, however, that the *Actes and Monuments* presents 'a notion of invention that does not react against discovery' and 'is not bound forever to the dialectical interchange between the given and the agentially created' [136] draws on Protestant thought to advance the central intellectual aim of *The Invention of Discovery.* Travis De Cook's lucid 'Unearthing Radical Reform' examines the interplay of discovery with notions of vanity and even blasphemy, representing the most successful détente here between the theological and natural philosophical. Through a close reading of clergyman Thomas Fuller's historical writings, especially his *A Pisgah-Sight of Palestine* (1650), De Cook exposes forces that militated against discovery, revelation, and invention in 17th-century England. In the process, we encounter the surprisingly useful (and prevalent) period rubric of anti-discovery and with it, a new hermeneutic with which to approach the closed dialectic of invention and discovery.

The emphasis on protestant theologies (and especially those of England), which characterizes not only the contributions of De Cook and Netzley but also that of Fleming, sometimes leaves aside pre-reformation traditions of discovery and invention that could have more fully informed these investigations. The Florentine patrician Palla

Strozzi's sincere investment in 're-discovering' the Greek gospels in the libraries of Byzantium might have proved a fascinating counterpoint to the antiquarian endeavors described by these authors. Poggio Bracciolini's almost obsessive drive to unearth ancient texts, recently brought to vivid life in Stephen Greenblatt's *The Swerve* [2011], provides yet another model for how discovery structured experience and knowledge-formation prior to the intersections of Protestant belief and early science.

The printing press, waiting quietly in the wings of many of the volume's essays, takes center stage in Vincent Masse's 'Newness and Discovery in Early-Modern France'. Turning to the material culture of French incunables, Masse proposes an unexpected and ultimately rewarding reevaluation of invention that understands novelty as a powerful rhetorical component of early printed texts. 'Newness' here vouches for, and characterizes, a symbiotic relationship between text and technology that served the interests of printers, book sellers, and authors at a moment of uncertain transition from manuscript to print. Reliant on the landmark works of Elizabeth Eisenstein and Lucien Lefebvre, Masse's essay might have been buttressed by direct engagement with revisionist scholarship on the supposedly essential attributes of print, especially the work of Adrian Johns [1998]. Nonetheless, the author's incisive turn to the rhetorical power of novelty serves as a model for the permeability of the literary, philosophical, and material within historical scholarship.

Indeed, connections between natural philosophy and early modern visual and material culture might have been explored more fully throughout this volume. The place of the visual arts is touched upon principally in Russell's essay and Fleming's introduction; yet 'invention' loomed especially large in the practice and rhetoric of early modern artists, and the conventional emulation of poetic invention in visual form might provide another lens for understanding the thorny dual nature of the volume's dialectic poles. Michael Cole's study of the profound impact of etching's invention not only on printmaking but on the visual arts as a whole, for example, sheds light on notions of invention active not only in Mosse's contribution but in Russell's as well [see Cole 2006]. Likewise, sustained attention to the material cultures of early modern mathematics, alchemy, and industrial design could provide further avenues for evaluating discovery's invention.

Occasionally, in their enthusiasm for the interdisciplinary, contributors overreach in their search for points of discrete contact between diverse traditions of knowledge. Michael Booth's adventurous essay argues that the polymath Thomas Hariott 'blended old world and new...mathematics and linguistics, invention and discovery' [59] in his contributions to algebra and his dictionary of the Algonguin language. The notion of the mutual communication of these starkly divergent enterprises is an interesting one but the congruences marshaled in its favor prove rather vague. Thus, Algonquin 'distributives "express the number of things taken at a time, as each one, two at a time, every third one, four apiece", which seems similar to what algebraic variables and coefficients do' [48]. A strong connection might be present, but this is assumed rather than elaborated and the judgement that distributives and variables 'seem' similar does not reassure a sceptical reader. The author attempts to account for these similarities through the application of 'blend theory', derived from cognitive linguistics. The conceptual framework, however, is not fully articulated here for those without a background in that field. That shared habits of mind informed these apparently separate activities is intriguing. Booth's ambitious study ultimately stops short, however, of fully bringing that congruence to life for the lay reader.

Steven Matthews' 'Francis Bacon and the Divine Hierarchy of Nature' proposes the reliance of Bacon's negative or eliminative induction on the pseudo-Dionysian *via negativa*. The essay expands upon a brief suggestion in Matthews' monographic study [2008] of Bacon's work. The proposed reliance pricks the reader's curiosity, not least on account of the claim that such connections have been largely overlooked. The author quickly acknowledges, however, that one of the principle reasons for the lack of study of pseudo-Dionysius in the Medieval Latin West (and Early Modernity in turn) was the ready assimilation of these concepts into the scholastic tradition at large. There is thus every reason to think that pseudo-Dionysian theology entered Bacon's thought in this rather more round-about fashion. Surely, it is important to understand Bacon in his own theological context (and Matthews' monograph achieves this aim impressively). Here however, it is not clear what we gain by putting too much stock in the direct rather than mediated entry of negative theology into Baconian induction.

Piers Brown's essay on travel narratives in Kepler and Galileo argues for the pivotal role of the scholar's journey in structuring the *Astronomia nova* (1609). Brown begins by distinguishing his notion of the journey from William Eamon's conception of the hunt (*venatio*) as a trope in his *Science and the Secrets of Nature* [1994, 269–300]. The rigid distinction between these models, however, is asserted rather than demonstrated and the evidence provided from Kepler's writings conform as easily to that of *venatio* as to itinerary. Thus, Mars is designated as the quarry and flees from castle to castle with the astronomer in pursuit. Yet, because Kepler writes that 'the route was unknown' between these hiding spots, Brown asserts that we are reading an appeal to itinerary rather than to hunting narrative [15]. Kepler's conceit of the triumphal cart similarly bespeaks mobility but not necessarily 'travel' or 'itinerary' in the sense those are usually employed. Evidence from Galileo is limited here to a single quotation from *Sidereus Nuncius* (1610). Significantly, this focus on a taxonomy of tropes leads Brown to eschew models that effectively blend diverse traditions. The *Astonomicon* of Marcus Manilius (first century AD), for example, was a widely available spur to terrestrial and celestial itineraries alike, inspiring the humanist geography of Francesco Berlinghieri (*ca* 1482) and the astronomical verse of Giovanni Pontano's *Urania* (*ca* 1479, printed 1509). Somewhat inflexible disciplinary distinctions are, hence, drawn here between activities that might have seemed rather more elastic for Galileo, Kepler, and their readers. This focus on classification renders problematic what is otherwise an eye-opening discussion of mobility and process in Kepler's work.

A similar retreat from ambiguity characterizes Jacqueline Wernimott's examination of René Descartes' challenging and enigmatic *The World* (published 1664). Approaching Descartes' model cosmos through the lens of the possible worlds paradigm, Wernimott seeks to free the treatise from its occasionally abusive wrangling into the generic containers of utopian fantasy or proto-science fiction. Instead, the author argues the treatise served as a model by which Descartes' readers were invited to understand mechanistic natural philosophy. The attempt, however, to impose a decisive break between *The World* and works like Lucian's *True History* (second century AD) and Bacon's *New Atlantis* (1624) ultimately imposes the conceit of a 'possible world' as a kind of hermetic seal. Treated as a sort of literary *unicum*, Descartes' treatise becomes detached not only from these forerunners

of speculative fiction but more problematically from the environment of resurgent atomism and even Epicureanism within which Catherine Wilson has situated the treatise [2008, 98–101]. Wernimott's conviction that the philosopher's paper world is best understood as a kind of model too could have benefitted from looking outside its literary context to consider the vibrant literature on the role of models in early science, especially the recent work of Matthew Hunter and Roman Frigg [2010].

Not all of the essays fully address the structuring questions and hermeneutic challenge issued by Fleming. Pietro Daniel Omodeo's contribution, for example, provides a succinct and useful description of competing 'Copernicanisms' in the work of Kepler, Giordano Bruno, and Giovanni Battista Benedetti. In teasing apart what are often taken to be facets of a single ideology, Omodeo's essay certainly remains within the spirit of the volume but the author does not address the roles of invention and discovery as explicit components of these paradigms' formation. Likewise, Louise Denmead's 'The Discovery of Blackness in the Early Modern Bed-Trick' is an important contribution to the study of markers of race on the English stage but its link to discovery is a tenuous employment of that term as a cognate for revelation. Here that revelation is of a fraudulent bedmate whose masquerade is unveiled to the audience. The relationship is largely a semantic one here and links to the broader tradition (and the relevance of such revelation to our understanding of early modern discovery) go unexplored. This represents something of a missed opportunity to bring the epistemological concerns of this volume to bear on the recognition and valences of race in early modern England.

As Fleming well realizes, invention and discovery serve throughout this volume not only as period appellations but also as powerful interpretive and epistemological models that swiftly (and often covertly) take their place as master narratives for the historian of science. For this very reason, an invaluable step toward a fully realized reassessment of such paradigms may be the expansion of our vocabulary beyond the confines of these titular classifications. The most promise in this respect is here shown by De Cook's examination of anti-discovery as a structuring trope that both undermined and animated antiquarianism in early modern England. In a similar vein, a kind of rapprochement between invention-discovery and other salient period rubrics, including curiosity and wonder, might complicate the

push and pull between apparently fixed alternatives [Evans and Marr 2006]. Among the models deployed by early modern poets, natural philosophers, historians, and painters alike were a host of iterations on 'rediscovery'—a category both related to invention/discovery and profoundly critical of their supposed opposition. For many readers, 'rediscovery' will immediately suggest the early modern fascination with antiquarianism, with Renaissance projects for the revival of pagan antiquity, raising the specter of the once fraught relationship between the supposed empiricism of early science and the strong yoke of classical authorities. Yet, as Christopher Wood and Alexander Nagel [2010], among others, have recently reminded us, the revival of classical antiquity was at least equalled (and sometimes bested) as a model by the potent conception of Christian resurrection as a rubric for novelty in the world. And Leonard Barkan [1999, 60–61] has long pointed to the darker side of such rebirth, calling our attention to antiquarianism's necromantic aspirations, the early modern invention of classical 'undead'. In digesting the lessons of this volume, we are charged with the responsibility of disarticulating binaries like that of invention/discovery, of introducing troubling third terms like resurrection and embracing the jointly hermeneutic and historicist task at hand. Ultimately, *The Invention of Discovery* should prove a spur to precisely this project, challenging the reader's acceptance of traditional and revisionist explanations for early modern science alike.

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