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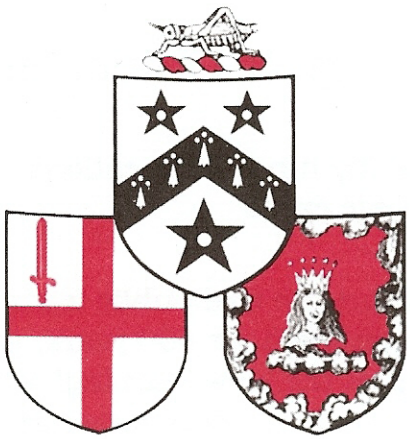

LITERARY LONDONERS

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JOHN DONNE and 'NEW PHILOSOPHY'

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A fair amount is known about the life of John Donne (1572 - 1631), both from contemporary sources and from the biography that was published in a volume of his sermons in 1640. He came from a moderately prosperous merchant family, studied at Oxford, became a member of Lincoln's Inn, was ordained in 1615, and made Dean of St Paul's in 1623. He was fairly well known as a poet, but famous as the foremost preacher of his day. Even in print, his sermons—which he wrote up himself from his notes—leave one in little doubt that he came honestly by this reputation.

During Donne's lifetime, and for about a generation after it, England was an intellectual backwater in almost everything except music. In European terms, English was a minority language. To address an international readership, one wrote in Latin. The apparently healthy state of London publishing in the vernacular is thus usually taken as an indication of a comparatively high rate of literacy. However, in looking at the readership of Donne's verse we are certainly considering a very small élite. The readership of the Anniversary poems (of 1611 and 1612) was probably made wider by the fact that they were concerned with matters of religion, but even so it is rather rash to take the content of the poems as evidence for the public understanding of natural philosophy. All the same, it is clearly evidence of a sort, and worth examining as such. We may note in passing that Donne's nicely up to date ideas about music are well expressed in 'The Triple Foole'. His opinions on some aspects of natural philosophy turn out to be equally well-informed about recent developments. There is, indeed, a certain amount of evidence that he may have learned about such developments from two of the most important of his scientific contemporaries, the physician William Harvey (1578 - 1657) and the astronomer Johannes Kepler (1571 - 1630).

I have carefully used the period term 'natural philosophy', and avoided the modern word 'science', because the terms are not equivalent. Natural philosophy was the complete study of natural things, shading off into Philosophy proper and into Theology (since Donne, and all the other people with whom we shall be concerned, believed absolutely that the World and everything in it expressed the purposes of the Creator). In connection with natural philosophy, 'science' would be taken to mean one of the 'sciences', that is either mathematics (comprising the sciences of geometry, arithmetic, astronomy and music) or one of the 'mixed sciences', subjects which could be treated either mathematically or philosophically (as, for instance, the study of light and vision).

Most parts of the natural philosophy of the early 17th century have respectable descendants in modern science, but two—partly regarded as respectable in Donne's time—have largely gone up in smoke. The first of these is Astrology. Astrology dealt with the effects of celestial bodies upon the Earth. It was universally recognised that the position of the Sun in the Zodiac determined the seasons, and it was also believed (somewhat less universally) that the Moon affected the sea, causing tides. These

phenomena were taken as the strongest evidence of celestial influence. It seemed reasonable to suppose that other celestial bodies also had similar, though much weaker, powers. The theoretical framework for such beliefs was the standard Aristotelian model of the World, in which the lowest place, in the centre, was that of the Earth, immobile and surrounded by 'spheres' (actually, in mathematical terms, spherical shells) of the other 'elements': water, air and fire. Above the sphere of fire was that of the Moon, then those of Mercury, Venus, the Sun, Jupiter and Saturn. Surrounding and containing all was the firmament, the sphere of the fixed stars. Above this was another sphere, or perhaps several, which moved, transmitting movement inwards to the whole system. Outside this moving world was the Empyrean Heaven of God, His angels and the Blessed.

The character of each 'element' included the form of motion natural to it. For instance, the element earth had a tendency to move downwards to its 'natural place' in the centre, and flames strained upwards with the movement of fire towards its own sphere. The Moon, and everything above it, were observed to go round in a regular fashion once a day—at least, that was the greatest part of their motions—and were thus clearly made of a fifth element (Aristotle had called it aether) to which such uniform circular motion was natural. Aristotle believed the Universe to be eternal in time and finite in space, which made this uniform motion without starting point or destination seem entirely fitting. However, in this simple form, the cosmological system could not cope with the demands of technical astronomy, that is mathematics, for descriptions of planetary motion that allowed accurate predictions of the positions of celestial bodies (as measured against the background of the fixed stars). So while philosophers were sure Aristotle was, in principle, more or less right, astronomers devised more complicated systems. The disharmony between philosophy and mathematics—which goes back to Ancient times—began to assume increasing importance in astronomy in the 16th century, and we shall find an echo of it in Donne's account of Mankind's attempts to understand the cosmos in *The first Anniversary* (161 1). Conventional astrology—one of whose chief uses was in weather forecasting, which was a serious matter in economies whose bases were largely agrarian—essentially took its rationale from the Aristotelian model in which the motion of the outer enclosing spheres governed what happened in the lower ones. The one lasting contribution Astrology made to a scientific understanding of the world was to be the notion of 'force', action at a distance, the power by which the Moon could move the sea or a magnet could attract a piece of iron.

The other part of natural philosophy that, as it were, failed to make it as a branch of modern science, was Alchemy. Alchemy was tied to astrology in that celestial influences were believed to play a part in alchemical processes. For instance, the Moon's effect upon liquids was believed to extend to making it easier or more difficult to melt metals, depending upon the position of the Moon. One may feel a certain sympathy with such beliefs if one reflects that alchemists were dealing with specimens of natural minerals which had (in our terms) highly variable chemical composition, and were thus liable to behave somewhat unpredictably. In any case, the chief legacy of Alchemy to emerging Chemistry was to be an untidy mass of empirical results, some of which proved useful. A splendidly sharp account of the less than respectable elements

in both Alchemy and Astrology is given by Ben Jonson (1572 - 1637) in *The Alchemist* (1610).

Donne's works contain many rapid and casual references to natural philosophy and the mathematical sciences. Here we shall be concerning ourselves with the more substantial ones in the two Anniversary poems, in *Ignatius his Conclave* (1611) and in an essay published posthumously, *Biathanatos* (1649). In fact, as we shall see, Donne seems to be more interested in natural philosophy than in the sciences.

Both the Anniversary poems were written in memory of Elizabeth Drury. Donne's sense of her Christian spirituality and the loss incurred by her early death gives both works an essentially pessimistic tone as far as the things of this world are concerned. *The first Anniversary is* entitled 'An Anatomie of the World'. In this context, 'An Anatomie' clearly has the sense of a public dissection of a body, with all the connotations of indignity that implies for the dissectee. Recent attempts to advance human understanding seem to Donne to be unhelpful and even indicative of philosophers' despair:

> And new Philosophy calls all in doubt,
> The Element of tire is quite put out
> The Sun is lost, and th' earth, and no man's wit
> Can well direct him where to look for it.
> And freely men confesse that this world's spent,
> When in the Planets, and the Firmament,
> They seeke so many new; they see that this
> 'Tis all in peeces, all cohaerence gone;
> All just supply and all Relation:
> Prince, Subject, Father, Sonne, are things forgot, ...
>
> *(The first Anniversary,* lines 205 - 215).

Donne is looking on the black side of things, but what he says cannot be faulted for its grasp of what is going on in the cosmological no-man's land where mathematicians and natural philosophers are attempting to construct a more satisfactory model of the planetary system. We shall return later to the work of Nicolaus Copernicus (1473 - 1543) whose sun-centred universe (in which the Earth is shot into the heavens) gets much more detailed treatment in *Ignatius his Conclave.* For the present we may note that Donne knows about two developments that historians' hindsight confirms as important. The first is the finding of new planets, that is the moons of Jupiter, which were observed by Galileo Galilei (1564 - 1542) in January and February 1610, and published in his *Message from the Stars (Sidereus nuncius)* in March of the same year. Galileo's book was an instant success—a pirated edition appeared at the Frankfurt book fair that year—so it is not in fact very surprising that Donne knew about it. But it is to his credit that he seems inclined to take Galileo seriously. Galileo had found four new 'planets', which one might fairly say was 'many'. However, Donne is leaning on the truth a little in claiming the discovery of many new stars in the firmament, unless he means to refer also to the numerous faint stars revealed by Galileo's telescope (according to Galileo). The 'new stars' recognised by astronomers were the bright stars

that had appeared without warning in 1572 and 1604. The first of these is now known as 'Tycho's supernova' because one of the first astronomers to see it, and certainly the one to write it up to best effect, was Tycho Brahe (1546 - 1601). Tycho had been much interested in astronomy in his youth, but by 1572 had largely turned to the study of Alchemy (he was a firm believer in astrology). On 11 November 1572, he emerged into the dark of the early evening, after a long stint of alchemical experimentation, and his first glance at the sky showed him an extra star in the constellation of Cassiopeia, almost directly overhead. His reaction was impeccably scientific: he refused to believe his eyes and instantly summoned his chemical assistant to confirm that the star really was there. Seeing it was the easy bit—the star was in fact so bright that it continued to be visible throughout the day. What was difficult was to prove beyond reasonable doubt that the star really belonged to the firmament and was not merely a local phenomenon in the sublunary world (as comets were generally believed to be). The new star turned Tycho's interest back to astronomy, and he went on to make twenty years' worth of observations of the planets. These observations of planetary positions were much more accurate than any made by his predecessors, and they allowed his erstwhile astronomical assistant, Johannes Kepler, to prove that the orbits of the planets were elliptical. That, however, is another story—though we shall see that Donne may well have known some of it. The new star of 1604 is now called 'Kepler's supernova', though cloudy weather in Prague ensured that Kepler heard about the star before he actually saw it. On the positive side, he may have noted that his astrological theory of weather prediction had suggested that a new star should cause rain? The new star of 1604 is named after Kepler because he wrote an important book about it, which Donne certainly knew (see below).

With hindsight, Donne's pessimism about new cosmology seems directed at the shadow rather than the substance, but many professional mathematicians would have shared the unease about the state of technical astronomy that he expresses later in the poem:

> We thinke the heavens enjoy their Sphericall,
> Their round proportion containing all.
> But yet their various and perplexed course,
> Observ'd in divers ages, doth enforce
> Men to find out so many Eccentrique parts,
>
> Such diverse downe-right lines, such overthwarts,
> As disproportion that pure forme: It teares
> The firmament in eight and forty sheires,
> And in these constellations then arise
> New starres, and old doe vanish from our eyes:
> As though heav'n suffered earthquakes, peace or war,
> When new Towers rise, and old demolish'd are.
>
> (*The first Anniversary,* lines 251 - 261)

This is a poetic, but essentially accurate, portrayal of the tension that many mathematical astronomers and natural philosophers recognised as existing between the best that could be done by way of cosmology and physics (expressed in the Aristotelian

model discussed above) and the best that could be done by way of predicting positions of the planets. (The 'new stars' mentioned in this passage are certainly those of 1572 and 1604.)

Whereas *The first Anniversary* was concerned with the World, *The second Anniversary,* first published a year later, has the title 'Of the Progresse of the Soule', and turns attention to human ignorance, and, indeed, to the failure to attempt to remedy it. Donne is decidedly dismissive of some of what passes for learning:

> What hope have wee to know our selves, when wee
> Know not the least things which for our use be?
> Wee see in Authors, too stiffe to recant,
> A hundred controversies of an Ant;
> And yet one watches, starves, freeses, and sweats,
> To know but Catechismes and Alphabets
> Of unconcerning things, matters of fact;
> How others on our stage their parts did Act;
> What *Caesar* did, yea, and what *Cicero* said.
> Why grasse is greene, or why our blood is red,
> Are mysteries which none have reach'd unto.
>
> (*The second Anniversary,* lines 279 - 289)

We may note that, deeply religious though he is, Donne clearly has no intention of appealing to the inscrutable ways of Divine Providence instead of searching for an explanation accessible to human intellect. He has in fact earlier mentioned some other specific problems, saying of the soul:

> Thou art too narrow, wretch, to comprehend
> Even thy selfe: yea though thou wouldst but bend
> To know thy body. Have not all soules thought
> For many ages, that our body's wrought
> Of Ayre, and Fire, and other Elements?
> And now they thinke of new ingredients,
> And one soule thinkes one, and another way
> Another thinkes, and 'tis an even lay.
> Knowst thou but how the stone doth enter in
> The bladder's cave, and never break the skinne?
> Know'st thou how blood that to the heart doth flow
> Doth from one ventricle to th'other goe?
> And for that putrid stuffe, which thou dost spit?
> Know'st thou how they lungs have attracted it?
> There are no passages, so that there is
> (For ought thou know'st) piercing of substances.
>
> (*The second Anniversary,* lines 261 - 276)

The part about the elements, with its frivolous suggestion that one might take bets on the outcome, is almost certainly a comment on the ideas of the followers of Paracelsus (Theophrastus Bombastus of Hohenheim, c.1493 - 1541), whose 'chemical' theories about the human body, and associated medical treatments, involved ideas and nomenclature that most historians find somewhat baffling. Moreover, some of the associated therapeutic recommendations seem dangerously heroic. Donne is possibly being a little disingenuous about the bladder stone. It had already been suggested that the stone grew inside the bladder, as minerals were believed to grow in the Earth. The coughing up of phlegm—'that putrid stuff which thou dost spit'— was considered as the body purging itself of an excess of that 'humour', but Donne is being fair in asking to be told how the process is meant to work. (Aristotle's theory of the cold in the head was that it was caused by the brain leaking out through the holes in the skull—a wonderful description of how the patient feels!)

The question about the blood is more unexpected. Indeed, it is so unexpected that it suggests very strongly that Donne had, at the least, attended a lecture about the action of the heart by William Harvey, who at this time was physician to King James. Harvey, who took a degree in medicine at Cambridge, went to Padua (the university of the Republic of Venice) to acquire a proper medical education, and then returned to England to practise, did not publish his discovery of the circulation of the blood until 1628 (that is many years after the publication of Donne's *Second Anniversary*) in a short book called *Anatomical exercise on the motion of the heart and blood in animals* (*Exercitatio anatomica de motu cordis et sanguinis in animalibus,* Frankfurt, 1628). However, Harvey did give some public lectures, under the auspices of the Royal College of Physicians, and it is possible that Donne may thus have had direct or indirect information about his researches. It is almost certainly Harvey's work that is in question because what Donne says raises a problem which conventional wisdom did not believe in. Conventional wisdom had it that there <u>were</u> passages through the interventricular septum that separated the ventricles of the heart. Since the septum has a complicated structure of coarse fibres running across it, it is not immediately obvious that the thing is in fact a tough wall of muscle, and any number of competent anatomists claimed to have observed the 'pores' that were necessary for the movement of the blood as described by Galen (AD 129 - c. 212). Harvey took the line of simply asserting that there were no such pores. However, this was not an important component of his argument as it was put forward in *De motu cordis.* There, the crunch of Harvey's reasoning is arithmetical. In the Galenic system, food digested in the stomach was transmitted to the liver, where it was made into blood, which travelled through the portal vein to the heart, some blood flowed through the septum to be mixed with air and 'vital spirit', and all blood flowed slowly outwards from the heart to the extremities, where it was absorbed. By means of a series of experiments (some of which his opponents said they were unable to replicate) Harvey established that the action of the heart was to transfer blood from the veins to the arteries (he renamed a couple of blood vessels in the process) and that the volume of the chambers of the heart was such that one could calculate, roughly, how much blood went through at each beat. Arithmetic showed that the amount going through the heart in an hour was many times greater than could be produced from food digested in the stomach. So the blood must circulate. Harvey's logic is extremely elegant, and opposition naturally focused on the

experimental evidence. Harvey himself had, however, worked very hard on that aspect—the well-designed experiments described in *De motu cordis* are the results of many years of research. It seems possible that it was this long-running series of anatomical experiments that Harvey had discussed in lectures that Donne had attended or heard about. Since refusing belief in the pores in the septum does entail providing some alternative motion for the blood, Donne's testimony is an interesting piece of evidence for the progress of Harvey's thought.

The Anniversary poems show that Donne was well informed about the natural philosophy of his day, but their tone is pessimistic. Human knowledge and abilities get much more up-beat treatment in *Ignatius his Conclave* (published in Latin, and in Donne's own English translation, in 1611), which is a religious satire directed at the Catholic Church in general, and the Jesuit Order and its founder Ignatius Loyola in particular. Donne describes his soul as having left his body and undertaken a journey to Hell. He declines to give details of the journey since describing the Universe is the prerogative of Galileo and *Kepler* (*Ignatius his Conclave,* pp.2, 3). Once in Hell, he finds that an 'Election' is in progress: Ignatius Loyola is a candidate for the accolade of having been the innovator whose works have caused most confusion in the world, thereby aiding the Devil in his task of leading Mankind to damnation. His rival candidates are first Nicolaus Copernicus, secondly someone who introduces himself as Philppus Aureolus Theophrastus Paracelsus Bombastus of Bohenheim *(sic),* and thirdly a Florentine who carries out a power-play analysis before deciding what to say, and then produces a line of reasoning that is breathtakingly tortuous. This last candidate proves to be Nick Machiavel in person (properly Niccolo Machiavelli, 1469 - 1527). Copernicus is there for his planetary system (in *On the revolutions of the heavenly orbs, De revolutionibus orbium coelestium,* Basel, 1543), which he describes as contrary to scriptural authority, common sense and just about anything else that is morally desirable. He alleges he has put Lucifer's prison, the Earth, in motion among the stars, thereby thwarting God's purpose of punishing him by assigning him the lowest place in the Universe. In fact, Donne produces a witty, slightly over-coloured, but entirely recognizable caricature of some of the many arguments that were actually urged against the Copernican system in the late 16th and early 17th centuries. It should be noted, also, that this is being written five years before Galileo had his first (mild) brush with the Holy Office, and that thr accusation that

> The fool wants to turn the whole art of astronomy upside down. But Holy Scripture shows Joshua told the Sun to stand still and not the Earth.

was a comment on Copernicus made by Martin Luther (1486 - 1546) in the 1530s. Donne may have known about Luther's outburst, but it seems very unlikely that he realised Galileo was heading for trouble with the Church. In fact, in his brief references to Galileo and Kepler, near the beginning of the book, he does not mention that Kepler was a leading defender of Copernicanism, and it is not clear that he knew Gaiileo was also a Copernican. Donne is apparently merely giving a good satirical account of ongoing skirmishes among philosophers and astronomers.

Ignatius is, of course, not short of a reply, though we are told that his education in matters of astronomy is recent, for while he was on Earth he

> knew not so much as Ptolemy's or Copernicus' name, but might have been perswaded, that the words *Almagest, Zenith* and *Nadir,* were Saints names, and fit to be put into the itanie, and *Ora pro nobis* joyned to them; yet after he had spent some time in hell, he had learnt somewhat of his Jesuites, which daily came hither.
>
> (*Iqnatius his Conclave. p.* 16)

Ignatius argues that Copernicus' theory is not conducive to moral corruption, though he suggests that the Pope might make Copernicanism a road to damnation by declaring belief in it damnable, and adds that it 'derogates from your right and title of comming to this place, that those opinions of yours may very well be true' (pp.18 - 19). Some English astronomers, of the generation before Donne, had been sympathetic to Copernicanism, but his remark is none the less sufficiently unorthodox in its day to require an explanation. Perhaps we are simply taking the text too seriously, underestimating the extent to which it is just good knockabout fun. However, a more serious explanation does lie to hand: Donne had in fact met Keper, for an hour or so, when he (Donne) visited Prague in the company of an English diplomatic mission, in 1608. Their conversation must have been in Latin, and its subject, from what we know of each of them, must have included God, astronomy and Copernicanism. After their meeting. Kepler sent him, via a third party, a book to be given to King James, namely a copy of Kepler's work on the new star of 1604.

The work in question is called *On the new star in the foot of Serpentarius (De stella nova in pede Serpentaril)* and was published only in 1606, Kepler having been very busy with calculations of the orbit of Mars at the time the star appeared. Unlike almost all Kepler's other works, *De stella nova* contains rather little mathematics, though the first section, which deals with the proof that this new star, like that of 1572, belongs to the firmament, presents series of observations and explains their significance in mathematical terms. On the whole, however, *De stella nova* does not require its reader to be an expert mathematician. Donne seems to have read it. The book cannot be the source of his comments about Copernicanism—though these might well be derived from his conversation with Kepler—but if we may judge from Donne's general attitudes to natural philosophy, it seems likely that he would have found Kepler's outlook sympathetic. Kepler writes in the same no-nonsense tone as Donne, and is equally unafraid to lay his opinions on the line. It is impossible to prove that Donne read and understood all of *De stella nova,* but he does actually cite it, and in a context where there was no need to do so, namely in an essay on suicide, called *Biathanatos,* that was published posthumously in 1649.

The Greek title *Biathanatos* could be translated as 'Death by violence' meaning death that came other than in the normal course of nature. It is a detailed exploration of opinions about suicide: whether it can ever be considered lawful, whether it is always to be considered a sin, whether, if it is a sin, it is one that can be repented or whether the

soul of the suicide is necessarily damned, and other matters of the same kind. A subject for a sermon has become the subject for an extended essay. Far on in his series of arguments, Donne attacks the notion that the longevity of a practice or belief may be urged in its defence, taking as an example St Augustine's opposition to divorce. He asks

> ... are not Saint Augustines Disciples guilty of the same pertinacity which is imputed to Aristotles followers, (p) who defending the Heavens to be inalterable, because in so many ages nothing had been observed to have been altered, his Schollars stubbornly maintain his Proposition still, though by many experiences of new stars, the reason which moved Aristotle seems now to be utterly defeated?
>
> (*Biathanatos,* p.146)

The reference '(p)' takes one to a note which says 'Kepler, De stella serpentarii, ch 23'. We may notice that there is, again, a slightly strange mention of 'many' new stars, but chapter 23 of *De stella nova* is indeed a correct reference. The chapter is entitled 'That the material of the heavens is capable of alteration' (*'Coeli materiam esse alterabilem'*) and the text begins

> Nor am I unaware that this opinion is at variance with Aristotelian Philosophy. Truly, to state the matter as it is, the opinion is against the henchmen rather than the leader. Give me Aristotle restored to life, my astronomical work goes so well that I should hope to convince him....
>
> *(Nec sum ignarus, quàm haec opinio sit inimica Philosophiae Aristotelicae. Verùm ut dicam quod res est; sectae magis, quàm principi est adversa. Da mihi redivivum Aristotelem; ita mihi succedat labor astronomicus. ut ego ipsi persuadere speraverim....)*

The chapter continues in much the same vein. There would seem to be little room for doubt that Donne had read it, and plenty of room to suppose that he enjoyed doing so.

I have no wish to claim that all Donne's comments on cosmological questions, questions of the structure of the planetary system or of the nature of the material of the heavens, should be traced back to the influence of Kepler, in person or in writing. Their attitudes do indeed seem to be in many respects rather similar, but this may well be a manifestation of a general similarity in temperament and in religious beliefs. In particular, Donne does not seem to have accepted one of Kepler's most central convictions, that cosmological problems could be treated in the same way as astronomical ones, namely by the appropriate use of mathematics. Kepler and Donne seem to have chosen to draw the line between the domains of Mathematics and of Natural Philosophy in different places. In this Donne was on the side of the majority among his contemporaries.

In any case, Donne's writings show much more interest in natural philosophy as such than in the more abstract mathematical sciences. For instance, it is very difficult to

believe that his conversation with Kepler did not involve his being given an account of Kepler's newly-completed work on the orbit of Mars, which he had laboriously proved to be elliptical. (There are nearly a thousand surviving sheets of Kepler's calculations, folio.) Kepler naturally assumed all other planetary orbits would likewise be ellipses with the Sun in one focus (and later proved it), so he had achieved a radical simplification of the complicated orbits that astronomers had traditionally ascribed to the planets. As we have seen, there is no breath of this success in Donne's 'Anatomie of the World' in *The first Anniversary,* where he complains about the complexity of astronomers' traditional devices. With hindsight (always 20/20) that complaint is two years out of date: Kepler's work on the orbit of Mars, *A new astronomy or celestial physics, argued from causes, presented in commentaries on the motion of Mars ... (Astronomia nova αιτιολογητος, seu physica coelestis, tradita commentariis de motibus stellæ Martis ...)* was published in 1609. For all the claim to celestial physics, which to contemporary readers would have implied philosophy rather than mathematics, Kepler's argument is heavily mathematical. The *New astronomy* proved impenetrable to most of Kepler's contemporaries. His planetary orbits were accepted only slowly, and as a result of the correct predictions of planetary positions in the tables Kepler based on the new orbits the *Rudolphine Tables (Tabulæ Rudolphinæ.* Ulm, 1627).

Historians seeking a tidy turn of phrase may wish to describe Donne as living in a time of 'mathematization of the world picture', but his tendency seems to have been to formulate things in terms that would at the time have been called 'more philosophical' but which in modern words we should call simply 'physical' rather than mathematical. This may merely reflect the fact that he was a layman in matters of mathematics, whereas his education and interests had made him competent in matters of philosophy. In any case, both the Anniversary poems and *Ignatius his Conclave* seem to assume that readers will be interested in 'new Philosophy' and the fact that the works went through several editions in the following half century suggests this belief may not have been misplaced