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THE INTERRELATIONSHIP OF SCIENCE AND RELIGION IN THE CIRCLE OF
MARIN MERSENNE

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THE INTERRELATIONSHIP OF SCIENCE AND RELIGION IN THE CIRCLE OF
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PREFACE

The idea for the subject of this dissertation came from a book by Richard S. Westfall entitled Science and Religion in Seventeenth Century England.¹ Since this topic combined two of my major interests, I looked for a similar topic in another period, or another country. While Westfall deals with England in the latter half of the seventeenth century, I found the first half of the century more interesting, since this is the period when the "Scientific Revolution" begins. I chose that period, therefore, and moved the setting to France.

Some way of limiting the topic for a dissertation had to be found, and since Westfall had chosen the members of the Philosophical Society of London, I adopted a similar approach. In the first half of the century there were two possibilities that could be explored. Two men established unofficial groups which encouraged the development of science. Not only by their own interest in theory and experiment, but, by corresponding with a great number of the eminent scientists of the day, they also acted as a clearing house of ideas, taking the place of the scientific

journals which later developed when scientific groups were officially established.

Those two men were Father Marin Mersenne, in Paris, and Fabri de Peiresc, in Aix. Since Mersenne was more centrally located, and was a member of a religious order, I decided to concentrate on him and on the group associated with him.

Thus I chose to write about the influence of science on religion in the scientific group which revolved around Mersenne. Since Mersenne and his friends were prolific writers, I decided to concentrate on his published correspondence (now in nine volumes of over 650 pages each) and on his books which throw light on the scientific developments of the day and are filled with information gleaned from friends and from his own wide reading. As the publication of Mersenne's correspondence has not yet been completed, I referred to the manuscript collections of his letters as well as to his manuscript books. I made no attempt, however, to read exhaustively all of this unpublished material, since this would only duplicate the work of his editor.

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CHAPTER I

INTRODUCTION

The Scientific Revolution is one of the most significant periods of change in the history of ideas. "It outshines everything since the rise of Christianity and reduces the Renaissance and Reformation to the rank of mere episodes, mere internal displacements, within the system of medieval Christendom."¹ In this revolution the whole world view of man underwent a basic change. The great medieval synthesis was breaking down.

During the Middle Ages, scholars had built upon the knowledge of antiquity, especially upon the great system of Aristotle, and used it as the foundation for their own thought. Into this system Aristotle had incorporated almost all branches of knowledge; - physics, astronomy, biology, metaphysics, ethics, and even poetics. Medieval scholars had taken over this knowledge, and fitted it together with the Christian religion to form the system known as scholasticism. In scholasticism, religion and

¹Herbert Butterfield, The Origins of Modern Science (New York: MacMillan Company, 1956), p. viii.

science, faith and reason complemented and supported each other. Dante's Divine Comedy illustrates this synthesis.

By the 16th century, however, this great system was beginning to crack. Certain weaknesses in Aristotle's science, such as his discussion of projectile motion, had always been criticized, but by the 16th century attempts were also being made to remedy deficiencies in the scholastic explanation. Some were trying to do this by returning to the "original" Aristotle. The medieval synthesis had been made possible by the removal of those elements of Aristotelian thought that did not fit together with Christian theology. Consequently any attempt to restore these elements led to charges of atheism. Others sought explanations in various kinds of neo-Platonism. Still others chose scepticism and the feeling that nothing could be known with certainty.

By the beginning of the 17th century, even those who wanted to remain orthodox were beginning to feel that the scholastic synthesis needed revising. Copernicus had taken the earth out of the center of the universe and made it simply another planet circling around the sun. With one blow he had not only destroyed the special position of man in the center of the universe, but had wiped out the dualism of a heavenly realm of perfection and a corrupt and changeable realm below the sphere of the moon. Although there were good reasons for not accepting this new view, it

still raised questions that were difficult to answer, especially when outstanding scientists began to adopt it and make use of it to explain other phenomena.

In spite of this rising criticism of the scholastic system during the 16th century, the new movements had not yet produced a sufficiently solid body of theory to replace the medieval Aristotelianism. During the years 1619-1625, this breakdown was felt in French intellectual life as a "crisis".² Vanini was burned at the stake as an atheist, a certain Frontanier was burned at the stake in Paris for teaching some occult or mystic doctrine, and a leading poet, Theophile de Viau was banished from Paris also on charges of atheism. In 1624 the Parlement of Paris forbade the teaching of new doctrines by some anti-Aristotelian alchemists. Despite this unfavorable climate of opinion, however, Pierre Gassendi published in the same year, a book attacking Aristotelian thought.³ This "crisis" was "a symptom of a much more general crisis through which intellectual life was passing. It is the transformation that marks the beginnings of modern times. The collapse of medieval teaching was becoming unmistakable."⁴

²J. S. Spink, French Free-Thought from Gassendi to Voltaire (London: The Athlone Press, 1960), pp. 5-6.

³Pierre Gassendi, Dissertations en forme de paradoxes contre les Aristoteliciens, trans. Bernard Rochot (Paris: J. Vrin, 1959).

⁴Spink, op. cit., p. 6.

There were several alternatives that could have been adopted in place of the faltering scholasticism. Aristotelianism was being refurnished as the medieval alterations were rejected by the exponents of Italian Naturalism. There was also a Neo-Platonistic trend which had incorporated ideas from Hermeticism and Cabalism. This view made much use of demonic powers of nature and ways of manipulating and influencing them. Some of these same ideas were used in alchemy in an attempt to form a chemical explanation of the world, although they were said to be derived from experiment. For those who were discouraged at the loss of a once satisfactory explanation of the world, and found the newer attempts inadequate, there was scepticism, which was revived in this period, and had several outstanding exponents. Springing out of all of this confusion, however, was a chain of thought that we identify today as the origins of modern science. A few men were developing ideas that are considered today the foundation of modern science. The beginning of the 17th century was, then, a period when significant changes in the world of ideas were being made, and when a confusing array of explanations was being offered.

The most significant area of intellectual life in the Middle Ages had been religion. Every branch of knowledge had been subordinated to theology, the queen of the sciences. The influence of ideas on religion was of prime

concern even during the Renaissance, and especially during the Reformation. Thus scientific explanations were obliged to fit in with the religious conception of the world. New theories were attacked by religious thinkers because of the harm, or supposed harm, that they might do to religion. This conflict between the two is the usual understanding of the relationship between science and religion. In some cases, however, religious ideas, as we shall see, actually contributed to the development of modern science, a fact that is less well known.

One of the best ways to investigate this situation is to choose a contemporary who was concerned with the developments in both religion and science, and to examine his attitudes and outlook. We are fortunate in having such a person in Marin Mersenne who was almost ideally situated to reflect the attitudes of the day toward these changes. Father Mersenne was not only a member of a religious order, the Minimes, but was also deeply involved in the development of a new scientific understanding of the world.

Father Mersenne was well educated for his day, having attended the newly opened Jesuit school at La Flèche and then studying in the University of Paris. After a few years' teaching in the Minime Order, which he joined, he returned to Paris and lived the rest of his life in the Minime Convent very near the French Court in the Place

Royale. During this period, Paris was one of the intellectual centers of Europe and Mersenne helped to make it so. France had recovered from the internal stress of civil war, and was beginning to play again an influential role as one of the major powers of Europe. He knew personally, or by correspondence, most of the leading contemporary thinkers. There is extant much of the voluminous correspondence which he exchanged with these leaders discussing the various scientific problems and developments.⁵ He also wrote numerous books discussing the interpretations of the day and incorporating suggestions from his many friends.⁶ Before investigating the intellectual currents of the period as reflected in Mersenne's writings and those of his friends, let us examine his qualifications to discuss these ideas.

In 1604, in the small town of La Flèche in the Loire valley, a new school opened its doors. This was the College of Henry IV, conducted by the only recently reestablished Jesuits.⁷ Not only did Henry IV allow them to set up a

⁵Among Mersenne's correspondents were Campanella, Descartes, Fermat, Galileo, Gassendi, Herbert of Cherbury, Hobbes, Huygens, Pascal and Peiresc.

⁶For a list of Mersenne's books and manuscripts see Robert Lenoble, Mersenne ou la naissance du mécanisme (Paris: J. Vrin, 1943), pp. xii-xxxii.

⁷The Jesuits had been exiled from France in 1598 as a result of an assassination attempt made on the king by Jean Chatel, a student who was said to be acting under the influence of the Jesuits. This was used as an excuse by the

school at La Flèche, he took a personal interest in the school, so much so, that at his death, following his request, his heart was buried there.

Henry recommended to his court that they should send their children to La Flèche for their schooling. Thus, the college from the very first gained an importance, not only because it was staffed by a religious order which was developing a reputation as a good teaching order, but also because of the contacts with persons of importance, or perhaps of future importance, that could be made by those who went there.

From the first, the Jesuit Fathers saw to it that not only children from families of important social and political position, but also talented children from less impressive backgrounds could attend the school. This latter group, called pensionnaires, were separately housed and had nearly all of their expenses taken care of by the school.⁸

It was by this latter means that Marin Mersenne was able to attend the school. Mersenne, born in 1588 in the village of Oyse, in the province of Maine, had attended

opponents of the Jesuits to get them banished from France in December, 1598. After some negotiation with Henry IV they were finally readmitted in 1603.

⁸ Camille Rochemonteix, Un collège de Jésuites aux XVII^e et XVIII^e siècles. Le Collège Henry IV de La Flèche (Le Mans: Leguicheux, 1889), I, 85.

grammar school at Le Mans until the college at La Fleche opened. He prevailed on his peasant parents to allow him to take advantage of the Jesuit education, and arrived there the first year of its opening. Mersenne probably entered the course of letters devoted to "humanitas", where he studied Latin and Greek, and by 1606 he would have begun the three year course of Philosophy.⁹

The course in Philosophy was based primarily on Aristotle. The first year dealt with Aristotle's logical writings, using as commentators, Tolet and Fonseca, and moral philosophy, using Aristotle's Ethics. The second year analyzed the Physics, de Coelo and the first book of de Generatione of Aristotle, as well as the mathematics of Euclid. The third year dealt with the second book of de Generatione, the de Anima and the Metaphysics. After 1626, however, the programs of the second and third year were reversed, with metaphysics being studied in the second year along with physics, and the third year being given over to mathematics.¹⁰

⁹Cornelis de Waard, "Note sur la Vie de Mersenne," in Correspondance du P. Marin Mersenne Religieux Minime, Publiee par Mme Paul Tannery, editee et annotee par Cornelis de Waard, avec la collaboration de Rene Pintard. (Paris: Gabriel Beauchesne, 1933), I, xix. Cited hereafter as Mersenne, Correspondance.

¹⁰Rochemonteix, op. cit., IV, 33. See also G.M. Pachtler (ed.) Ratio studiorum et institutiones scholasticae societatis Jesu, Vol. V of Monumenta Germaniae paedagogica, ed. Karl Kehrbach (Berlin: A. Hofmann and Company, 1887), pp. 334, 344.

The educational program of the Jesuits was set forth in a document entitled Ratio atque instutio studierum societatis Jesu, first published in 1586. Because they were destroyed a few years later, copies of this edition of the Ratio were rare until reprinted by Pachtler.¹¹ From the first, this document caused difficulty, along with other publications of the Jesuits, who were determined to go their own way theologically, thus stirring up opposition to those who constituted themselves defenders of a more traditional orthodoxy. Since these ideas of the Jesuits undoubtedly found their way into their teaching at La Flèche, and since they help to explain some of Mersenne's ideas, let us examine them briefly.

It is perhaps surprising that the philosophical and literary teaching of the college at La Flèche has not yet been thoroughly examined.¹² Such a study would be of interest not only to students of Mersenne, but to Descartes scholars as well. The four volume work by Rochemonteix on the college at La Flèche does not discuss the controversial nature of the ideas of the Jesuits of this period. It does

¹¹ Augustin et Aloys De Backer, Bibliothèque de la Compagnie de Jésus (nouvelle ed. par Carlos Sommervogel; Paris: Alphonse Picard, 1890), I, 489.

¹² Henri Gouhier, Les Premières pensées de Descartes (Paris: J. Vrin, 1958), p. 7. Gouhier is right in commenting that even J. Sirven, Les Années d'apprentissage de Descartes (1596-1628) (Paris: J. Vrin, 1930), has not investigated this topic deeply.

analyze the teaching at the college as far as the conflict with Cartesianism later in the 17th century is concerned, and gives useful information about some of the material taught, but does not fit it into the controversies between the Jesuits and other orders within the Church, nor does it show just exactly what views the Jesuits were supporting, except in their attitude toward Copernicanism and Cartesianism.¹³

One aspect of the Renaissance was a reaction against metaphysics and a desire for a naturalistic, rather than a revealed, ethics. The Jesuits were founded to counter the desire for naturalistic explanations in the Renaissance. They did, however, tend to adopt the emphasis on literature and make use of it in their teaching. St. Ignatius encouraged the young theologians of the company to try to develop a Jesuit theology, rather than simply accept the Thomistic ideas.

Faute d'entrer franchement dans la tradition thomiste établie, les jeunes théologiens de la Compagnie se trouvèrent tout de suite réduits à l'éclectisme, se trouverent plus tard réduits à un syncrétisme opportuniste qui n'avait rien des synthèses supérieures. Loin de viser à un principe éminent d'unité, ils se trouvèrent condamnés par la force des choses à ne chercher que des ... moyennes.¹⁴

We will find later these same tendencies in Mersenne: a

¹³Rochemonteix, op. cit. (4 vols.).

¹⁴Pierre Garin, Thèses cartésiennes et thèses thomistes (Paris: Desclée, 1932), p. 24.

willingness to hope that something new will come along to replace Thomism, a definite eclecticism with regard to scientific explanations, and a lack of interest in meta-physical explanations.

The Jesuit attitude toward St. Thomas was expressed in the 1586 edition of the Ratio studiorum. It stated that St. Thomas's ideas ought to be followed in theology and the arts, except for some which could be questioned, and listed 17 items that did not require the support of the professors of scholastic theology.¹⁵ The Ratio studiorum was written during the generalship of Aquiviva, who consulted one of the ten founders of the order before publishing the document. He was advised that the Jesuits should not be forced to follow St. Thomas with regard to propositions for which there seemed to be other good authority.¹⁶

The Ratio studiorum did cause some trouble to the Jesuits. Difficulties arose because there were Thomists within the order who complained, and criticism came from other areas of the church as well. A list of propositions under dispute was submitted to Pope Sixtus V, and he and the Spanish Inquisition set up an investigating committee in 1588. The Holy Office sent the list to Aquiviva,

¹⁵Pachtler, op. cit., pp. 308-16.

¹⁶P. Mandonnet, Pierre Felix, "Sur le Thomisme des premiers temps de la Compagnie de Jésus," Revue thomiste, XXII (1914), 668.

indicating neither approval nor disapproval, but with instructions that the rejected ideas of St. Thomas be restored. After Sixtus V's death, Pope Clement VIII intervened, and asked the Jesuits to accept the authority of St. Thomas. They gave the appearance of following this request, and in the 1599 edition of the Ratio studiorum some modification was made.¹⁷ The Ratio studiorum was published in France in 1603. It was recommended by Aquaviva to Father Barni, the Rector of La Fleche, and in 1603 was adopted by him.¹⁸

About this time, further trouble developed in Spain over the Jesuit Father Molina's ideas on grace and freedom of the will. Molina expressed a view concerning the freedom of the will, which met with a storm of criticism and attack from the Dominicans in Spain who were upholding Thomism against him. The Jesuits appealed to Clement VIII in Rome. Examining congregations, called the De auxiliis, considered the problem for ten years, from 1598-1607. They lodged several condemnations of Molina's ideas, but Pope Paul V suspended the condemnations. Aquaviva, however, accepted this criticism, and in

¹⁷Ibid., pp. 669-670. See also Gabriel Compayré, Histoire critique des doctrines de l'éducation en France depuis le seizième siècle (Paris: Librairie Hachette et Cie, 1879), pp. 168-69, 196.

¹⁸Rochemonteix, op. cit., II, 4.

1613 substituted the Jesuit theologian Suarez for Molina.¹⁹ This controversy later developed into the Jansenist controversy with the Jesuits. It is no doubt because of this Jesuit emphasis on freedom of the will that Mersenne was a voluntarist.

On leaving La Flèche, about 1609, Mersenne went to the University of Paris, where he studied Humanities under Marius Ambosius, Georges Criton, and Theodore Marsile, and Theology (in the Sorbonne) under André du Val, Philippe de Gamaches, and Nicolas Ysambert.²⁰ He probably continued this study of languages and theology for two years, and then on July 17, 1612, he joined the Minime Convent in Paris.²¹ Mersenne seems to have left the University without having received any further degree. This can perhaps be explained by Mersenne's interest in the Minimes which began, according to his friend and biographer De Coste, when he stopped at a Minime convent on his way to Paris.²² The "Rules" of the Minime Order, which stressed humility, specified that no member should be raised to the dignity of the doctorate nor receive any other scholarly degree.²³

¹⁹Mandonnet, op. cit., pp. 673-75.

²⁰Hilarion de Coste, La Vie du R.P. Marin Mersenne théologien philosophe et mathématicien de l'Ordre des Pères Minimes (Paris: Sebastien Cramoisy, 1649), p. 9.

²¹De Waard, op. cit., p. xx. ²²De Coste, op. cit.

²³René Thuillier, Traduction nouvelle des regles, du correctoire et du cérémonial de l'Ordre des Minimes de S. François de Paule (Paris: P. Giffart, 1703), p. 87.

If Mersenne first considered joining the Minimes while he was studying in Paris, he no doubt realized their lack of interest in his acquiring the degree. Therefore, having completed two years' extra study in theology, he would not have felt impelled to continue until he got the degree.

The Minimes are today an order that very few have ever heard of. A legitimate question, therefore, is why Mersenne, coming from one of the leading schools in France, which had been encouraged by the court, would join such an order. The answer is simply that from their founding at the end of the 15th century down to the time of the French Revolution, the Minimes were a very important order in France. Despite the fact that they were in such an influential position, however, very little has been written about them.²⁴

The founder of the Minimes, St. Francis de Paule, (c.1416-1508), had established a small hermit order in 1436 in Italy. His reputation grew slowly, and he became known especially for miracles of healing which he had performed. For this reason, Louis XI persuaded Pope Sixtus IV to send St. Francis to France in 1483. St. Francis did not want

²⁴Giuseppe Maria Roberti, Diseño storico dell'Ordine de Minimi dalla morte del Santo Istitutore Fino ai nostri tempi (1507-1902), Vol. I (Roma: Tipografia Poliglotta, 1902), Vol. II (Roma: Societa Tipografico-Editrice Romana, 1908). This is the only recent history of the Minime Order. The part on the sixteenth and seventeenth centuries is merely a translation into Italian of chronicles of the order written in that period.

to go, but obeyed the command of the pope. When he arrived, however, he could do nothing for Louis XI except help reconcile him to his approaching death, which came in that same year. For the remainder of his life St. Francis lived in France in close relationship to the French Court, on which he exercised a major influence at the end of the 15th century and the beginning of the 16th. His influence was especially strong during the reign of Charles VIII, who built two convents for the order which St. Francis had established, and which began to expand rapidly in France.²⁵

There were four principal rules for orders in the Church, that of St. Basil, of St. Augustine, of St. Benedict, and of St. Francis of Assisi. Although St. Francis de Paule was attracted by the last of these, he decided to write his own, revising it several times, but gaining approval of the final rule from Pope Julius II in a Bull of 1506. To the three usual vows of poverty, chastity and obedience, he added a fourth, that of humility. From this vow sprang the name, Minimes. The major emphasis was on leading an austere life, and thus all the Minimes took a vow of perpetual Lent, shunning not only meat, but anything of animal origin, such as milk, eggs, cheese, fish, or any kind of animal grease.²⁶

²⁵René Alphonse Marie de Maulde la Clavière, Les Origines de la révolution française au XVI^e siècle (Paris: E. Leroux, 1889), p. 57.

²⁶Thuillier, op. cit., p. 76.

Francis was neither a theologian nor a writer of spiritual tracts. His single written work, outside of a few letters, was the "Rules" for the order. He was uneducated and expressed himself in a kind of jargon.²⁷ This perhaps explains his antagonism to the acquiring of advanced degrees.²⁸

Charles VIII built two convents for the Minimes, one at Amboise, and one at Tours, with funds from the Royal Treasury. Also while he was in Rome, he saw to it that a convent of Minimes was established there. One of the richest establishments of the order was the convent near Place Royale, which owed much to the liberality of Henry IV, Louis XIII and the Regent Marie de Medici. The latter laid the first stone in 1611, and very shortly thereafter a church and cloister were completed within a block of the Place Royale, where the court was to be found in the 16th and 17th centuries.²⁹ It was in this central location that Mersenne lived throughout most of his life. Because of its close ties with the French Court, the Minime

²⁷Robert Fiot, Jean Bourdichon et Saint François de Paule (Tours: Société archéologique de Touraine, 1961), p. 38.

²⁸Although the order did take in those with educations, and seemed always to encourage the work of Mersenne.

²⁹Abbé Dabert Pradier, Les Grands fondateurs d'ordres. Saint François de Paule, fondateur des Minimes. Tours: A. Mame et fils, 1895), p. 105.

Order was very hard hit by the French Revolution.³⁰ In 1789 the Estates General held some of its meetings in the church and cloister of the Minime Order.³¹ By the middle of the 18th century there were 450 convents, 150 of them in France.³² In 1911, there were only nineteen convents, fifteen in Italy, two in Sicily, one in Sardinia and one in Spain.³³

After becoming a member of the Minimes, Mersenne was sent to the convent in Nevers in 1614, to teach philosophy and theology. By 1618, he had been promoted to the post of "Correcteur" of the convent at Nevers. This was not the kind of position for which he was suited, however, and in 1619, he was returned to the convent near the Place Royale where, except for a few brief trips, he lived for the remainder of his life.

While Mersenne was in Nevers, he began a practice that he was to continue all his life. He wrote letters to those whom he thought would have some expert knowledge of subjects which interested him. Thus he began to write letters filled with questions on subjects he wanted to

³⁰ Francesco Russo, Bibliografia di San Francesco di Paola (Roma: Curia generalizia dell'Ordine dei Minimi, 1957), p. 11.

³¹ Lucien Lambeau, La Place Royale (Paris: H. Daragon, 1906), p. 221.

³² Pradier, op. cit., p. 142.

³³ "Minimes", Catholic Encyclopedia, Vol. X.

know more about, to some of the leading men in Nevers. In this manner he not only acquired knowledge for himself, but he also stimulated his friends' thinking about the kinds of problems which interested him. He encouraged them to put down their thoughts on the subjects, in letters and even in books. By continuing this practice with an ever wider and more illustrious circle of friends, Mersenne eventually came into contact with many of the most important thinkers of his day.

We have only seven letters remaining from this period, but they indicate what Mersenne was to do in the future. Among these first letters are some to Claude Bredeau, an advocate at Nevers, and to someone identified as Naquert and to Arnould Bernard, both doctors at Nevers. The following are some of the questions that Mersenne raised, and illustrate the kind of thing that interested him: how Johathan's eyes were enlightened by eating honey,³⁴ the possibility of curing by sympathetic magic, as Moses did by setting up a brass serpent for the people to look at,³⁵ the effect of rabies, and whether a person smitten with rabies could kill himself, or whether others could kill him, without doing

³⁴Claude Bredeau a Marin Mersenne, 21 octobre 1617, no. 1, Correspondance, op. cit., I, 5.

³⁵Naquert à Marin Mersenne, (Automne, 1617), no. 3, ibid., p. 15. Dates of letters enclosed in parentheses were decided upon by the editor and were not given on the manuscripts from which they were published.

wrong.³⁶

By 1619, he was moving further afield to consult experts. He wrote a letter to Father Jacques Saint-Rémy, Rector of the school at La Flèche, to inquire about astronomical chiromancy, judicial astrology and palmistry. Father Saint-Remy did not answer the questions himself, but gave the letter to Father Cristophe Brossard, Prefect of Studies of Philosophy and Theology, to answer. Father Brossard rejected these ideas and cited several authorities to support his position.³⁷

After moving to Paris, Mersenne continued his correspondence concerning matters scientific and theological. Until recent times, Mersenne was known primarily as Descartes' friend and correspondent. It is now realized, however, that he did not act merely as a go between for the leading scientists of the period, but actually encouraged their work by asking them questions which he assumed they would know something about. The answers he received he then passed on to others and awaited their reactions. In this way he not only encouraged those with something to contribute, but actually directed their thinking along certain lines.

³⁶Claude Bredeau à Marin Mersenne, 24 novembre 1617, no. 5, ibid., p. 33.

³⁷Jacques Saint-Rémy à Marin Mersenne, 3 octobre 1619, no. 6, ibid., pp. 40-41.

Living in Paris, the intellectual center of France, in an order which was closely connected to the court of France, Mersenne was ideally situated to encourage the development of science. One way of doing this, in addition to his voluminous correspondence, was to attend meetings where scientific interests were being discussed.

Meetings held for various purposes were characteristic of the 17th century. There were numerous academies in Italy during this period, such as the Humoristi, the Lincei, and the Phantastici in Rome, and others in other major cities.³⁸ France likewise had its groups. In the 16th century an academy which concerned itself with poetry and music was organized in Paris by Jean-Antoine de Baif.³⁹ In 1570 it received the approbation of King Charles IX, and continued to meet even after the death of de Baif, in the home of Jacques Mauduit, until broken up by the Civil Wars which were then raging. It is probable that Mersenne heard about this group from Mauduit who lived near the Minime Convent.⁴⁰

³⁸Le Gallois, Conversations de l'académie de Monsieur L'Abbé Bourdelot, contenant diverses recherches, observations, experiences, & raisonnemens de physique, medicine, chymie, & mathématique et le parallele de la Physique d'Aristote & de celle de Mons. Des Cartes, leu dans la dite academie (Paris: Thomas Moette, 1673), pp. 13-14.

³⁹Francis R. Yates, The French Academies of the Sixteenth Century (London: The Warburg Institute, 1947), p. 286.

⁴⁰De Waard, op. cit., p. 44.

Other groups were meeting in Paris during Mersenne's lifetime. The Académie Française, for example, was organized in 1634 to direct the literary taste and to determine standards of the use of the French language.⁴¹ Another group dealing with literature and science met in De Thou's library under the leadership of Jacques and Pierre Du Puy. Mersenne was a member of this group, although his opinions were not always appreciated.⁴² Included in this group were La Mothe Le Vayer, known for his scepticism, Gabriel Naudé and Pierre Gassendi, who are called "libertins" or free-thinkers.⁴³ Also among those who met regularly at De Thou's cabinet was Elie Diodati, a Protestant who was very interested in the new developments in science. Diodati corresponded with Galileo and received from him manuscripts of Galileo's books.⁴⁴

From a very early period Mersenne was interested in the possibility of a society which would concern itself primarily with science, although other things, such as

⁴¹Mersenne à Fabri de Peiresc, 2 août 1634, no. 367, Mersenne, Correspondance, IV, 281-82.

⁴²Philippe Fortin de la Hoguette à Pierre Dupuy, 9 février 1626, no. 29, ibid., p. 379. De la Hoguette wished that Mersenne could be excluded from the Du Puy's group for criticizing Bacon.

⁴³Spink, op. cit., pp. 14-21.

⁴⁴Elia Diodati à Galileo Galilei, 16 mai 1634, no. 337; 12 mars 1635; no. 414, 10 avril 1635, no. 420, Mersenne, Correspondance, IV, 156; V, 106, 132.

theology, could be included. In the preface to his first book, Quaestiones celeberrimae in Genesim, published in 1623, he suggested that if learned men from all over Europe would meet under the auspices of the Pope and of the Catholic princes to form an academy, they could bring about a restoration of the sciences.⁴⁵

Finally in 1635, he was successful in establishing a society which would concern itself primarily with mathematics. The most direct reference we have to this society is to be found in a letter from Mersenne to Nicolas-Claude Fabri de Peiresc, describing the group that Gassendi would meet when he arrived in Paris. Mersenne listed six names of those who participated in the meetings.⁴⁶ Various others have been added since then by historians until the list numbers 17 names and includes such well known persons as the two Pascals, father and son, Descartes, Gassendi

⁴⁵Quaestiones celeberrimae in Genesim, cum accurata textus explicatione. In hoc volumine athei, et deistae impugnantur et expugnantur, et Vulgata editio ab haereticorum calumniis vindicatur. Graecorum et Hebraeorum musica instauratur. Francisci Georgii Veneti Cabalistica dogmata fuse refelluntur, quae passim in illius problematibus haventur. Opus theologis, philosophis, medicis, jurisconsultis, mathematicis, musicis vero, et catoptriciis praesertim utile. Cum indice quadruplici, videlicet locorum Scripturae Sacrae, quae in toto libro explicantur, concionatorio, quaestionum, et rerum, quae passim agitantur (Lutetiae Parisiorum: Sumptibus Sebastiani Cramoisy, 1623), p. e verso. Cited hereafter as Quaestiones celeberrimae in Genesim.

⁴⁶Mersenne à Peiresc, 23 mai 1635, no. 435; Peiresc a Mersenne, 20 août 1635, no. 472; Mersenne à Peiresc, (fin d'août ou début de septembre 1635); Mersenne, Correspondance, V, 209, 353, 371.

and Hobbes.⁴⁷ Little is known specifically about this group other than the references made in Mersenne's letters. Some information can be pieced together about it, however, from various sources. It was undoubtedly to this group that Gilles Persone de Roberval read a mathematical paper of Pierre Fermat in 1637.⁴⁸ And it was almost certainly this group to which the younger Pascal belonged in 1639.⁴⁹ The group was in all probability referred to variously as "Matheseos Academie" and "Academia Parisiensis".⁵⁰

After Mersenne's death, the meetings were continued by Abbé Picot, then by Le Pailleur, and finally it became Montmor's academy.⁵¹ Out of Montmor's academy was later to grow the Académie Royale des Sciences. This line of descent from Mersenne's group to the Académie Royale des

⁴⁷René Pintard, Le Libertinage érudit dans la première moitié du XVII^e siècle (Paris: Boivin et cie., 1943), I, 91.

⁴⁸Pierre Fermat, Oeuvres de Fermat, ed. Paul Tannery et Charles Henry (Paris: Gauthier-Villars et fils, 1891), II, 103.

⁴⁹Reinhold Dezeimeris, Pierre Trichet un bibliophile bordelais au XVII^e siècle (Bordeaux, G. Gounquilhaou, 1878), pp. 18-19.

⁵⁰Charles-Henri Boudhors has discovered references to a society by this name, which he says is undoubtedly Mersenne's group. See his article, Pascal: 'L'Académie Parisienne' et la crise de 1654," Revue d'histoire littéraire de la France, 36(avril-juin, 1929), 235.

⁵¹Harcourt Brown, Scientific Organizations in Seventeenth Century France, 1620-1680 (Baltimore: The Williams and Wilkins Company, 1934), p. 32.

Sciences was pointed out as early as the 17th century.⁵² It has even been suggested that Mersenne's academy formed the model for the Royal Society of London.⁵³ Since the nucleus of the Royal Society of London began its meetings in 1645, it could not have gotten its idea from Montmor's academy, as some have suggested. It is possible, however, that the idea might have come from Mersenne's group.⁵⁴ What we can say with certainty is that Mersenne played a leading role in encouraging the development of science, not only by his correspondence, but also by the meetings which he helped to foster.⁵⁵

This discussion demonstrates that Mersenne occupied a significant place in the development of modern science. Indeed he can furnish a key to an understanding of the period, since, reflected in his books and correspondence, are the basic ideas of his day. A study of the interrelationship of his religious thought and scientific theories begins,

⁵²Jacques Cassini, "De l'origine et du progrès de l'astronomie," Mémoires de l'Académie Royale des Sciences depuis 1666 jusqu'à 1699, VIII (1730), 31. Bernard de Fontenelle, L'Histoire de l'Académie des Sciences, depuis 1666 jusqu'en 1699, Vol. I: Oeuvres (Paris: Salmon, 1825), p. 4.

⁵³M. J. Poté, Eloges historiques (Le Mans: Fleuriot, 1816), p. 17.

⁵⁴Charles Adam, Philosophie de François Bacon (Paris: Felix Alcan, 1890), pp. 336-337.

⁵⁵Although it is perhaps a little too much to say that it was Mersenne who by his correspondence and his scientific society made Paris an intellectual center, as Brown says, op. cit.

therefore, with an examination of his first major publication.

Quaestiones celeberrimae in Genesim, Mersenne's first great work, is a large folio size volume, containing over 1800 columns of Latin text, followed by another 440 columns entitled separately Observationes.⁵⁶ The work itself was influential during Mersenne's lifetime, for it established him as a scholar. Evidence that it was widely read throughout Europe can be seen by the controversies it stirred up from England to Germany.

Mersenne wrote the book as a theologian, and thus intended to discuss many of the contemporary theological problems. He was also, however, as we have demonstrated, interested in scientific problems which preoccupied his contemporaries. For this reason the book, although written basically in the form of a commentary on the first book of the Bible, is interspersed with other material which makes it no longer a simple biblical commentary, but more complex in character. It is, in fact, an attempt to discuss many facets of knowledge in an encyclopedic fashion. Thus we find, scattered throughout the biblical commentary, articles affording the best information available on a large variety

⁵⁶Observationes et emendationes ad Francisci Georgii Veneti problemata. Hoc opere cabala evertitur; editio vulgata, et inquisitores sanctae fidei catholicae ab haereticorum, atque politicorum calumniis accurate vindicantur. (Lutetiae Parisiorum: sumptibus Sebastiani Cramoisy, 1923). Cited hereafter as Observationes.

of subjects. Mersenne believed that every branch of knowledge was potentially useful to religion. He realized that much of the material which others used to criticize religion could, instead, be shown to be compatible with it.

Mersenne is, in fact, very eclectic, since he draws his knowledge from a great variety of sources, and often discusses the same problem in different places. This accounts for the difference in approach to the same topics in various sections of the book.

Mersenne intended his book to be a scholarly discussion; it abounds, therefore, in references to earlier writers which his reader could consult if he wished. This method is in contrast to that of some of the other authors of the period, e.g. Descartes and Pascal, who imply that they are discussing only their own ideas, and consequently do not refer to the source of their knowledge. They profess not to be interested in the opinions and ideas of their predecessors.

In the preface Mersenne reveals some of his reasons for writing the book. There were some in his day who were criticizing theologians for following only Aristotle. Of those who made this charge, Mersenne lists Campanella, Bruno, Telesio, Kepler, Galileo and Gilbert, who were trying to develop new theories not contained in Aristotelian thought. But, he insists, theologians are not so bound to Aristotle that they cannot accept new answers. One purpose

of the book, then, is to examine the various explanations advanced in the name of science, to determine whether they are valid scientifically, and whether they conflict with religion.⁵⁷

There were some who feared that studying these new ideas made one an atheist or a deist. Mersenne admits that many of those who developed new theories had forsaken Catholicism for Protestantism, and ended up as deists. Yet he contends that this was not the necessary outcome of attempts to find new answers, provided these attempts were made in the right spirit.⁵⁸

For these reasons Mersenne wrote Quaestiones celeberrimae in Genesim. He hoped to separate valid scientific ideas from anti-religious ones. To do this he had to have some kind of standard by which to judge. For him the criteria were the doctrines of the Catholic Church, and he would accept no ideas that conflicted with them. He submitted his own work to the Church and stood ready to abandon anything that was contrary to church doctrine. He was, in effect, attempting to set forth what was known of the new science, and which ideas could be accepted by a good Catholic.⁵⁹ His clarification of these points would enable people to refute the charge that science leads to atheism.

⁵⁷Quaestiones celeberrimae in Genesim, op. cit., p. e.

⁵⁸Ibid. ⁵⁹Ibid., p. eiii verso.

Mersenne was concerned, then, less with the treatment of specifically theological topics, than with showing that the new learning need not be hostile to the Church. His major concern is not a confrontation of Catholic and Protestant theology, although he does comment in passing on some of the points at issue between them. Instead he is participating in the debate within the Church itself, on how it should assimilate all the knowledge that has been made available to it, and on how it should react to the attacks on Aristotle.

CHAPTER II

ATHEISM AND ITALIAN NATURALISM

At first sight the organization of Quaestiones celeberrimae in Genesim seems haphazard, to say the least. Frances Yates has speculated about its central theme, yet no one has really analyzed it thoroughly.¹ Since it is typical of its author's verbosity and his unsystematic way of attempting to deal with all the problems facing the scholars of the period, we shall begin by examining its apparent lack of organization.

What Mersenne had in mind was somewhat similar to the plan followed by Tostati a century earlier, except that the latter's book is a much more straightforward commentary. Several verses of Scripture are quoted, followed by a commentary discussing them. Then several more verses are quoted, also followed by a commentary. Each commentary contains a series of questions indicated by Roman numerals in the margin of the text. The questions are numbered

¹Frances A. Yates. Giordano Bruno and the Hermetic Tradition (Chicago: The University of Chicago Press, 1964), p. 434.

continuously and do not start again after every quotation.²

Mersenne follows more or less the same procedure in his Quaestiones celeberrimae in Genesim. Instead of giving long quotations of several verses, however, he gives short quotations, sometimes only a few words. Instead of the questions being indicated simply by Roman numerals in the margins, Mersenne has made them the main divisions of the text. This seems somewhat confusing, because the chapters of the book of Genesis are set out in bold face type, and might also be used as another kind of division.

The book is intended, as the title indicates, as a commentary on the book of Genesis. As such it can be compared to some of the other commentaries. A survey reveals that Mersenne added a great deal of material to his book that other contemporary scholars would have considered extraneous. Richard Simon, for example, one of the earliest and most outstanding of those known as Biblical critics, criticized some writers for being too prolix and for adding extraneous material. Though he did not mention Mersenne's book specifically, it typified those commentaries which contained much more than a simple analysis of Genesis.³

²Alphonsi Tostati, Opera omnia, quotquot in scripturae sacrae expositionem et alia, adhuc extare inventa sunt (Venetiis: Jo. Baptistam, et Jo. Bernardum Sessam, 1596).

³Richard Simon, Histoire critique du Vieux Testament (Rotterdam: R. Leers, 1685), pp. 412-26.

Perhaps Simon's failure to mention Mersenne's book indicates that it was rarely regarded later in the century as a commentary on the Bible. In fact as we shall see later, most of the references to it say little about that part of the book. Mersenne specifically states that he is omitting several questions that have been raised by other commentators. For example, he is not going to consider the problem of who the author of the Pentateuch might be.⁴ The omission of questions such as this and the inclusion of extraneous detail make this unlike other Biblical criticisms. Undoubtedly the bulk of the book, the variety of subjects treated in it, and its very confusing organization hampered its use to later generations.

Part of this confusion results from Mersenne's insertion into his commentary on Genesis of material dealing with two other major topics: a commentary on two books by Julius Caesar Vanini, and a commentary of a book by Georgio Veneti. This results in a division of the book into three major parts. The first, dealing with Vanini, is 675 columns long. The last third, discussing Veneti, contains 440 columns, and is, as we have already remarked, given a separate title. The middle third is the Biblical commentary, interspersed with articles on a great variety of subjects. It contains approximately 1200 columns. All three parts

⁴Quaestiones celeberrimae in Genesim, op. cit.,
p. e.

deal with attempts to explain the natural world, made necessary by the breakdown of the scholastic synthesis.

The first part discusses Vanini's ideas, which are based on Italian Naturalism. Mersenne felt that this attempt to replace scholastic Aristotelianism was not satisfactory. Veneti's attempt to explain the natural world, through Hermeticism-Cabalism, he also found unacceptable. The middle part, discussing Genesis, was based on scholastic Aristotelianism and on certain elements of the new science. The chief difference between this part of the book and earlier Bible commentaries, is the fact that Mersenne made use of the new science in his discussion of Genesis. He was the only one of the commentators in this period to do so.⁵ This would explain why Mersenne included seemingly extraneous material in his book. Although some of the new ideas did not fit into the scholastic picture, Mersenne seemed to think that the latter view was preferable to the other two. We might conclude that scholasticism was more compatible with the development of the new science than were the other two alternatives presented here.

The first of these major divisions is presented as an attack on atheism, and is itself divided into seven

⁵Arnold Williams, The Common Expositor. An Account of the Commentaries on Genesis, 1527-1633 (Chapel Hill: The University of North Carolina Press, 1948), p. 179.

sections.⁶ Mersenne begins with a few brief comments about the names of God,⁷ followed in section two by 36 proofs of the existence of God, given, as he says, to refute and convert the atheists.⁸ To these he adds 18 causes why people become atheists.⁹ The fourth section is a refutation of 16 ideas about God by the Protestant Flacius Illyricus and is in the form of a critical commentary on a section from one of Flacius' books.¹⁰ Sections five and six, the two longest, deal with the books of Vanini and are the most important for our discussion here.¹¹ Last comes a "Colophon," which, although it is the briefest, is the best known section, because Mersenne wrote two versions of it.¹² The first version containing

⁶Quaestiones celeberrimae in Genesim, op. cit., cols. 15-668. The portion of this part devoted exclusively to a commentary on Vanini's books is cols. 281-668. The two books of Julius Caesar Vanini dealt with here are: Amphitheatrum aeternae providentiae divino-magicum, christiano-physicum, nec non astrologo-catholicum, adversus veteres philosophos, atheos, epicureos, peripateticos, et stoicos (Lugduni: Antonii de Harsy, 1615), and De admirandis naturae deque mortalium arcanis, libri quatuor (Lutetiae: Adrianum Perier, 1616). All of the Amphitheatrum and the fourth book of the De admirandis naturae, dealing with the religion of the pagans, has been translated by M. X. Rousselot, Oeuvres philosophiques de Vanini (Paris: Charles Gosselin, 1842).

⁷Quaestiones celeberrimae in Genesim, op. cit., cols. 15-24.

⁸Ibid., cols. 24-226.

⁹Ibid., cols. 225-36.

¹⁰Ibid., cols. 236-78.

¹¹Ibid., cols. 279-668.

¹²Ibid., cols. 669-674.

some rash statements about atheists was replaced in most copies of the book before they were distributed.

The major significance of this part of Quaestiones celeberrimae in Genesim is its attack on Italian Naturalism as represented by Vanini.¹³ The approach of Italian Naturalism to science was one of those that had to be rejected or modified in certain basic details, before the kind of work to which we trace back modern science could develop. The ideas of the Italian Naturalists represented a challenge to the orthodox religious ideas of the day, and it is at the point where this Naturalism impinged on religion that Mersenne took up the attack against it. In order to defend religion, he criticized the weaknesses in the Naturalistic point of view and attempted to use the new science against it. The result was that in this instance religion assisted, rather than hindered, the development of modern science.

Both Vanini and Mersenne begin their books after some preliminaries with discussions of proofs of God. Vanini, however, gives only five ways of proving Divine Providence, which he does by proving the existence of God.¹⁴ Mersenne may have adopted the idea of this beginning from Vanini. The 36 "proofs" of the existence of God have been

¹³For a discussion of Vanini as a representative of Italian Naturalism, see Roger J. Charbonnel, La Pensée italienne au XVI^e siècle et le courant libertin (Paris: E. Champion, 1919), pp. 303-307.

¹⁴Oeuvres philosophiques de Vanini, op. cit., pp. 8-49.

drawn from a great variety of sources, including the arguments of St. Thomas based on first cause and prime mover.¹⁵ Not all of the explanations are proved in Mersenne's opinion. There are some ridiculous and false ideas among them, but he has drawn truth from them and rejected their falseness.¹⁶ Here he is probably referring to his comments on fraudulent divination, demons, magic, and enchantments, in which he demonstrates that these ideas presuppose a belief in the existence of God.¹⁷

These proofs of God reveal to us a characteristic trait of Mersenne. He is willing to take ideas that bear on a subject from all sources in the hope that some of them will be useful. We will see this same kind of eclecticism in his later publications on current scientific questions. The arguments are taken from St. Thomas, St. Anselm, St. Augustine and others, without regard to any criticism made of the arguments. St. Thomas, for example, rejects the ontological argument of St. Anselm, but Mersenne simply ignores that fact. He makes no attempt to assess the value of the arguments, but simply presents them for what they are worth.¹⁸

¹⁵Quaestiones celeberrimae in Genesim, op. cit., cols. 35-36.

¹⁶Ibid., cols. 1-2.

¹⁷Ibid., col. 102.

¹⁸Robert Lenoble, op. cit., pp. 247-59. Lenoble gives a brief analysis of some of these proofs.

Mersenne follows these proofs with his discussion of why people become atheists. We will not list all of the reasons he gives, but will comment on only a few.¹⁹ Some of them are of such a nature that they could have existed in any age, as, for example, the idea that it is the vanity and foolishness of men that lead them to become atheists. He often repeats the Biblical quotation, "the fool has said in his heart, there is no God."²⁰ Other reasons relate to the rise of Protestantism. He suggests that heresy and atheism both spring from pride, and that, because one sometimes finds heretics ready to swear by falsities and even suffer death for them, some are led to the conclusion that it is better to believe in nothing. Catholics are sometimes at fault for allowing it to appear that heretics demonstrate greater love than they.²¹

Some of the reasons might be seen to be connected with the scientific interests developing in this period.²²

¹⁹Lenoble, ibid., pp. 174-75, lists all eighteen causes, but does not discuss them at length.

²⁰Quaestiones celeberrimae in Genesim, op. cit., col. 226.

²¹Ibid., cols. 231-32.

²²On this point I disagree with Lenoble, op. cit., p. 175, who says with regard to these eighteen reasons for atheism, "bien rares sont là-dedans les objections scientifiques ou métaphysiques à l'existence de Dieu." It seems to me that some of these objections to the existence of God are motivated by the same impulses that were encouraging the development of science in this period.

Mersenne attributes some atheism, for example, to a belief that the natural order of things is constant and that there is no need, therefore, of a cause; there is too much concern for natural things and an attempt to explain everything by natural causes. For another, many people who become atheists depend on the senses alone, and do not believe in miracles, because they are of the opinion that a natural, rather than a supernatural, explanation can be given for them.²³ These are some of the ideas of Italian Naturalism which Mersenne is especially anxious to attack in Quaestiones celeberrimae in Genesim. Also mentioned here are those which demand a mathematical or geometric type of proof. It was perhaps to meet this demand that Mersenne derived some proofs of God from mathematics and geometry.²⁴

In section four Mersenne undertakes to refute certain ideas of one of the leading Protestant theologians of the 16th century, Flacius Illyricus. Flacius began as a friend of Luther's, but after Luther's death, Flacius insisted on clinging to certain ideas of Luther that lost him the support of the mainstream of Lutheran thought as represented by Melanchthon. He ended up being charged

²³Quaestiones celeberrimae in Genesim, op. cit., cols. 231-34.

²⁴Ibid., cols. 39-54, 55-75.

with the heresy of Manichean dualism.²⁵ One of his books was a commentary on the New Testament. From this book Mersenne chose a brief discussion that contradicted some of his own basic presuppositions.²⁶ An analysis of this section of Quaestiones celeberrimae in Genesim throws light on some of the prevailing theological problems.

The idea that Mersenne condemned the most vigorously was Flacius' insistence that God cannot be proved to be an innate idea, but must be known by revelation in faith. Flacius insisted that he was following Luther in the idea that man, by reason alone, and without the scriptures, could have no better idea of God than do animals. Man's reason, he believed, was so corrupted by the Fall, that even when he thought about God, he developed idols. He gave several references to Scripture which he interpreted

²⁵Nouvelle biographie générale, XVII (Paris: Libraires de l'Institut de France, 1856), p. 806. Flacius has received attention in recent years. For a discussion of the same ideas that interested Mersenne, see, Günter Moldanke, Schriftverständnis und Schriftdeutung im Zeitalter der Reformation. Teil I. Matthias Flacius Illyricus (Stuttgart: W. Kohlhammer, 1936), pp. 31-37; and Lauri Haikola, Gesetz und Evangelium bei Matthias Flacius Illyricus (Lund: Berlingska Boktryckeriet, 1952), pp. 21-25.

²⁶Novuum Testamentum Jesu Christi filii dei, ex versione Erasmi, inumeris in locis ad graecam veritatem, geniunumque sensum emend. Glossa compendiaria, M. Matthiae Flacii Illyrici Albonensis in Novum Testamentum (Basileae: n.p., 1570). The sixteen arguments given by Flacius are taken almost verbatim by Mersenne from the "Glos. super Epist. Pauli ad Rom. Cap. II," from a section entitled "Quod non habeantur iam innatae notitiae de uno vero Deo, creatione, et providentia," pp. 670-72.

as saying that man could not know God, e.g., 1 Cor. 2:14, "But the sensual man does not perceive the things that are of the Spirit of God, for it is foolishness to him and he cannot understand."²⁷

Mersenne gives a variety of answers to this statement. Appealing, for one answer, to the authority of many of the Church Fathers, he specifically rejects the contention that the Scriptures contain all that is necessary for salvation and insists that the Church is the decision maker. It was the Church, he says, that decided what constituted the Scripture.²⁸

In another answer Mersenne uses the argument based on causality that arises in dealing with Physics. The properties and qualities of things in nature lead us to the idea of God. For relationships of cause and effect cannot be traced back infinitely, but must be traced back to some first cause which is God.²⁹

Mersenne gives a warning to those who would come to too quick a conclusion about religious matters. If, he says in an analogy, we wish to reconstruct a statue by Phidias from one finger, we ought to study all the parts of the body first in order to perceive the harmony and symmetry of the whole work. Likewise those who wish to

²⁷Quaestiones celeberrimae in Genesim, op. cit., cols. 239-40.

²⁸Ibid., col. 262.

²⁹Ibid., cols. 244-45.

know the works of God ought to investigate his creation more. This is exactly what Mersenne was attempting to do — study the major realms of knowledge, especially science. One who does this, he says, will realize that a knowledge of God can be derived from a study of nature.³⁰

Some of Mersenne's answers to Flacius are based on general conclusions about the nature of man, e.g. that all men believe in some kind of divinity. Flacius speculates that a man raised in a forest away from other men, and away from any ideas of God, would have no conception of God. Mersenne simply answers that farmers and Indians do have some such concept, and thus the idea of a divinity is innate in men. Mersenne recognizes, however, that such knowledge alone is not sufficient for salvation.³¹

Although he makes use of authority in citing the Church Fathers, Mersenne does not accept all authorities. There are times when they conflict, as do Plato and Aristotle on the question of innate knowledge. Plato puts forward a doctrine of reminiscence, while Aristotle insists that we are born with a tabula rasa for a mind. On this point Mersenne disagrees with Aristotle and with Flacius, and instead insists, with Plato, that we do have an inborn knowledge of God.³²

³⁰Ibid., col. 248. ³¹Ibid., cols. 259-61.

³²Ibid., cols. 263-64.

Another major disagreement between Mersenne and Flacius is on the question of free will. Flacius insists that he is following Luther in the belief that, as a result of the Fall, the will is dead to the good and alive only to evil. So, since knowledge of God is good, man has lost all power to know God. Mersenne's voluntarism, which he learned from the Jesuits, would not allow him to accept this viewpoint. He insists that man's will remains free even after the Fall.³³

This section, then, does not deal specifically with atheists. It is the expression of a Protestant view that man can not know about God by the use of his natural reason, and must therefore rely on faith. Mersenne is at pains to contradict that view, since the basic conception in his writing is that man can know God through reason. Indeed this is the main idea underlying his analysis of science. Mersenne probably discovered Flacius' view, which, as he mentions, had for long been a point of dispute between Catholics and Protestants, while looking through various recent Biblical commentaries, and since it fits in here with his concern over proofs of God, he decided to refute it. He considered the rejection of the possibility of a natural knowledge of God the first step toward atheism.³⁴ Mersenne's attitude concerning the power of

³³Ibid., cols. 251-54.

³⁴Ibid., col. 235.

reason made him interested later in Herbert of Cherbury.³⁵ Some of the basic points made by Cherbury are already used here by Mersenne.

We now come to the longest section of this first part of Quaestiones celeberrimae in Genesim which extends from column 279 to 654. This section is, in reality, a commentary on the two books of Julius Caesar Vanini. The first of Vanini's books is dealt with in "Objections of the Atheists" numbers 2 to 24, and a portion of the second book in "Objections" 25 and 26.³⁶

Vanini is often mentioned by those who write about this period because his death aroused so much excitement at the time.³⁷ Mersenne's Quaestiones celeberrimae in Genesim is often cited because of the names Mersenne calls him, e.g. "that atheist Vanini" and "stultissimus".³⁸ No one, however, including Lenoble, has realized that the

³⁵ See Mario M. Rossi, Alle fonti del deismo e del materialismo moderno (Firenze: "La nuova Italia" Editrice, 1942), for a discussion of Mersenne's relationship to Herbert of Cherbury.

³⁶ Quaestiones celeberrimae in Genesim, op. cit., cols. 279-456, 457-668.

³⁷ See for example, Henri Busson, La Pensée religieuse française de Charron à Pascal (Paris: J. Vrin, 1933), pp. 316-339; Roger Charbonnel, op. cit., pp. 303-307; Julien-Eymard D'Angers, Pascal et ses précurseurs: L'Apologétique en France de 1580 à 1670 (Paris: Nouvelles éditions latines, 1954), pp. 12-13; René Pintard, op. cit., pp. 20, 61-67, 590.

³⁸ Spink, op. cit., p. 32n.

major portion of this first part of Quaestiones celeberrimae in Genesim is devoted to a critical discussion of Vanini's two works. This is significant for several reasons.

First of all, this provides a contemporary reaction to the ideas Vanini set forth in his books. It becomes no longer necessary to speculate about how his ideas may have been interpreted at the time.

Mersenne's book is not only a contemporary analysis of Vanini's ideas, it is one of the few which tries to understand and criticize them in detail. Most writers simply refer to Vanini's conviction as an atheist, and assume that his books were filled with impiety and that they show a hypocritical attitude toward religion.³⁹ One of the few who gives a short analysis of Vanini is J. S. Spink.⁴⁰

Secondly, the importance of realizing that this part of Quaestiones celeberrimae in Genesim is primarily a commentary on Vanini, lies in the fact that it enables us to check not only the source of some of Mersenne's ideas and comments, but also his references to other authors. When we do this we become aware that some of

³⁹Charbonnel, op. cit., did not even try to analyze the books, but translated some selections from them and indicated that he thought their wickedness spoke for itself.

⁴⁰Spink, op. cit., pp. 38-42.

the opinions and even phrases sometimes attributed to Mersenne were really adopted by him from Vanini.⁴¹

The realization that much of the information in Quaestiones celeberrimae in Genesim comes from Vanini raises the question of whether or not Mersenne read the books he cites here so frequently. In most cases, the specific references to authors, such as Pomponazzi and Cardan, come from Vanini's books. Mersenne's reference to the books he himself has read, for example, Vanini's works, are often general rather than specific. We might almost say, as a general rule for reading Quaestiones celeberrimae in Genesim, that where the bibliographical references are given very explicitly, they were usually copied. Where Mersenne himself had read the book, he just comments vaguely, "as Vanini says."

This is not to detract from Mersenne's wide reading. For he was well read, especially in the sciences, as an examination of some of the references in the second part of Quaestiones celeberrimae in Genesim reveals. It does mean, however, that certain ideas attributed to Mersenne were sometimes adopted by him from Vanini and that those who wish to credit Mersenne with them will need

⁴¹Lenoble, op. cit., p. 178n, for example, realized that Mersenne and Vanini made similar comments about Machiavelli, but Lenoble attributed sincerity to Mersenne and lack of sincerity to Vanini. This might seem a little unfair to Vanini, if we realize that Mersenne simply copied these comments from Vanini.

first to check Vanini.⁴² We can conclude, however, that, regardless of the source of the comments, since Mersenne chose to repeat them, he had adopted them as his own.

Thirdly, the realization that this part of Quaestiones celeberrimae in Genesim is based on Vanini's books helps clear up the question of Mersenne's organization. Several authors have commented on how confusing it is.⁴³ It was not evident to them why this part of the book dealt at length with atheism. We now see that since Vanini's first book, Amphitheatrum, criticized atheists, Mersenne has made anti-atheism the theme of his own discussion. Mersenne followed the sequence of Vanini's arguments, agreeing with some and vigorously attacking others.

Lastly, the chief value of this part of Quaestiones celeberrimae in Genesim lies in the fact that it is here that Mersenne confronts Italian naturalism and gives his reasons for rejecting it as a possible basis for the development of science. Vanini forms the main link in this

⁴²Lenoble, op. cit., pp. 112, 120-21, 128-29, mistakenly assumed that Mersenne had read Pomponazzi and Cardan. Instead, his references to them were taken from Vanini. Williams, op. cit., pp. 242-43, likewise attributed the discussions of Sextus Empiricus, Diagoras and Epicurus to Mersenne, not realizing that much of this material also came from Vanini.

⁴³Yates, Giordano Bruno and the Hermetic Tradition, op. cit., p. 434, says, "the contents seem confusingly arranged." Williams, op. cit., p. 17, comments that in meeting the problems of organization, "Mersenne is a conspicuous example of failure."

period between Italian Naturalism and French thought. A glance at the topics discussed by him in his De admirandis naturae shows his interest in developing a systematic explanation of the natural world.⁴⁴ The kinds of scientific explanations that grew out of this approach were rejected by Mersenne, partly for religious reasons. Pomponazzi, the leading exponent of this view, rejected miracles as supernatural occurrences and gave instead naturalistic explanations for them.⁴⁵ It is these naturalistic explanations which Vanini adopted from Pomponazzi, that Mersenne attacks the most vigorously.

Before analyzing Mersenne's critique of Italian Naturalism, let us give a few brief facts about Vanini's life, taken primarily from Spink's account, which is perhaps the best of the recent discussions of Vanini.⁴⁶

Julius Caesar Vanini (1585-1619), born in the Kingdom of Naples, studied medicine and theology in Naples, Rome and Padua, the last of which was the center for the development of the ideas that we refer to as Italian Naturalism. During his early years he was a member of

⁴⁴The four books of the De admirandis naturae are: I. De coelo et aere, II. De aqua et terra, III. De animalium generatione et affectibus quibusdam, IV. De religione ethnicorum.

⁴⁵Pietro Pomponazzi, Tractatus de immortalitate animae (Collatis tribus editionibus denuo edidit, M. Christ Godofr. Bardili, Tubinge; n.p., 1571).

⁴⁶Spink, op. cit., pp. 28-42.

the Carmelite Order. In his later life he followed a pattern that Mersenne criticized as typical of many atheists; in 1612 he went to England and left the Roman Catholic Church to become a member of the Church of England. He soon fled England, however, and returned to Paris and the Roman Catholic faith. While he was in Paris, he published the two books we are considering here. He then made the mistake of going to Toulouse, where he was tried, convicted and executed for atheism in 1619.⁴⁷

It is not our purpose here to examine the question of Vanini's guilt or innocence of the charge of atheism. Mersenne simply accepted Vanini's guilt, as did most other writers who commented on Vanini for several centuries. It was probably the excitement caused by his execution that led Mersenne to deal with Vanini's books. Despite the fact that Mersenne believed Vanini an atheist, he did not reject all of Vanini's ideas. In fact, Mersenne occasionally repeats something with the comment "as Vanini rightly says."⁴⁸ Mersenne accepted the story that Vanini set out from Italy with twelve companions to teach atheism in Europe. By this he probably meant that Vanini set out to teach Italian Naturalism.⁴⁹

⁴⁷Spink, ibid., pp. 29-31, has translated the few contemporary accounts of the trial and execution.

⁴⁸Quaestiones celeberrimae in Genesim, op. cit., col. 538.

⁴⁹Busson, op. cit., p. 339, was aware that Mersenne sometimes used the term "atheist" to mean an Italian naturalist.

One of the basic points of disagreement between Merseune and Vanini, as between Merseune and Flacius, is on the power of natural reason. Although from a different viewpoint, Vanini, like Flacius, maintains that several ideas in the Christian religion cannot be proved by natural reason. He insists that some of the traditional proofs of the existence of God are inadequate. He rejects, for example, the one derived from motion which calls God the Prime Mover. Since God is transcendent, and exists outside of all movement, He cannot be the first intelligence that sets the universe in motion. This kind of reasoning, therefore, does not prove the existence of God.⁵⁰ Such an interpretation runs counter to Merseune's view as expressed in his 36 proofs of the existence of God.

Vanini agrees with the Italian Naturalists that there are certain things that cannot be proved by reason and indeed are even contradicted by it. The naturalists denied, for example, that the immortality of the soul could be demonstrated by reason. Vanini, in accordance with this view, says that he does not believe that an afterlife can be proved by reason, although he is willing to accept it because the church says that it is so. Since all that begins must come to an end, the soul can be

⁵⁰Vanini, Oeuvres, op. cit., p. 2.

assumed to do the same, although God could prevent it if He chose to do so. Likewise, some insist that we have no evidence of anyone returning from the dead, but, says Vanini, the Church tells us that they have.⁵¹ Mersenne, on the other hand, contends that since the soul is independent of the body, reason tells us that it does not perish with the death of the body, and that, furthermore, its continued existence is necessary in order to punish evil and reward good.⁵²

Another of the major points of dispute between Mersenne and Vanini, as between Mersenne and Flacius, centers on the question of free will. In the Amphitheatrum Vanini stresses the idea of divine providence, which he defines as the eternal power of God that precedes all things. God, who is above and beyond the universe, acts through the intermediary of divine reason, which expresses itself in the intelligences moving the stars. It is this divine reason, ruling all things, that constitutes providence, and it is providence, expressing itself by means of the stars, which controls the destiny of man. Providence is not foreknowledge, because to God all time is present. He sees everything as a point, and for Him, therefore, there is no before and no after. This interpretation is

⁵¹Ibid., p. 53.

⁵²Quaestiones celeberrimae in Genesim, op. cit., cols. 366-69.

one Vanini shares with Pomponazzi, Cardan and other naturalists.⁵³

Mersenne takes up the same position on this point with Vanini as he had done with Flacius. Man has free will which he can exercise regardless of any influence from the planets. He is willing to admit that the planets may exercise some influence on man, or act as a sign of things to come, but they do not cause them to happen. It is true that man could not act without God, who, in the last analysis, is the source of all power and all activity. Without Him, nothing would exist, or move, or be. But this does not mean that we can attribute to God any responsibility for the actions or the sins of man. Instead, God, by his concurrence, provides for the order of the world in a divine "concourse"; that is, he supports the activities of the world and makes them possible by this concourse. But this sustaining power of God is indifferent to the use made of it. God leaves that to man's free will to decide. Mersenne, then, is insistent that man does have free will and is thus responsible for his sins. In a way, God can be said to make sin possible, since through the divine concourse, he holds the world in being. Yet He does not condone sin and cannot be said to be responsible for it. This analysis of man's situation is designed by Mersenne

⁵³Vanini, Oeuvres, op. cit., p. 7.

to place the blame for his misdeeds fully on man, who has wrongly exercised his free will. Merseune insists on stressing his "voluntarism" in contrast to Vanini's emphasis on "providence", which might seem to absolve man of his responsibility and to attribute it to God.⁵⁴

One part of Vanini's Amphitheatrum to which Merseune refers deals with the problem of miracles. Since this is the subject under discussion in Vanini's second book, De admirandis naturae, only a few points introduced in the first book need be mentioned here.

Vanini admits that a true miracle cannot be explained by natural means, and confesses that Christian miracles are therefore true miracles. There are many other events reported in history, however, that are not true miracles in that they do not fall under this definition, and so can be explained naturally.⁵⁵ This is one of the basic postulates of Italian Naturalism. Vanini accepts this, thereby admitting that there are many marvellous properties in nature. These marvellous properties must exist in order that an explanation can be found for the unusual and marvellous events which are reported in history.

⁵⁴Quaestiones celeberrimae in Genesim, op. cit., cols. 317-18.

⁵⁵Vanini, Oeuvres, op. cit., p. 45.

Mersenne's approach to this problem differs from Vanini's. Instead of accepting the fact that these marvellous events actually took place, thus finding himself in the position of having either to agree that there are such things as pagan miracles or to explain them by forces in nature, Mersenne rejects the truth of the reports. He says, for example, that Pliny who is the source of many such reports is simply not telling the truth. Experience convinces us that many of the things reported in antiquity are untrue.⁵⁶

Spink thought that Vanini expressed a belief in miracles in his first book, but changed his mind in the second book and rejected them.⁵⁷ The reason for this is that in his first book Vanini is discussing Christian miracles, which, as a good Catholic, he says he is prepared to believe on the authority of the church. In the second book, however, the events that he is discussing are so-called pagan miracles, and it is these that Vanini is rejecting. We must admit, however, that part of the reason for Vanini's condemnation by later writers is that they believed his attack on pagan religion to be simply a disguised way of attacking the Christian religion. Vanini's second book, the De admirandis naturae was

⁵⁶Quaestiones celeberrimae in Genesim, op. cit.,
cols. 381-82, 541-42.

⁵⁷Spink, op. cit., p. 40n.

considered to be much more of an attack on Christianity than was the Amphitheatrum.⁵⁸

Section six, in which Mersenne deals specifically with the fourth book of the De admirandis naturae, has 44 chapters. He lists the topics discussed in these chapters as follows: whether His works prove the existence of God, the appearance of angels, divination and oracles, the cure of illness, and resurrection. A comparison of this list of topics with the ten chapters in Vanini's book reveals that Mersenne is following Vanini's order, but that he is condensing Vanini's ten points into five major topics, the discussion of which he expands into 44 chapters.⁵⁹

Mersenne's major purpose in dealing with Vanini as a representative of Italian Naturalism, is to defend the idea of miracles against those who would explain them away as the result of some natural and occult power of

⁵⁸Ibid., pp. 28-38.

⁵⁹Vanini, De admirandis naturae, op. cit., gives the following chapter headings in book IV:

L.	De deo	
LI.	De apparitionibus in aere	
LII.	De oraculis	
LIII.	De sybillis	
LIV.	De daemoniacis	
LV.	De sacris ethnicorum imaginibus	
LVI.	De auguriis	
LVII.	De valetudinum curatione quae sub ethnicorum religione mirabiliter quibusdam contigit	4)an morborum curationes
LVIII.	De mortuorum resurrectione	5)an resurrectio mortuorum
LIX.	De fascinationibus	
LX.	De insomniis.	

Mersenne, Quaestiones celeberrimae in Genesim, op. cit., cols. 461-62, gives the following list of topics he is going to discuss:

- 1)an aliquis effectus Deum esse probet.
- 2)an angelorum apparitiones
- 3)an devinationes et oracula

nature. In order to defend miracles, Mersenne examines the explanations given by the naturalists and attempts to show that they are inadequate to explain Christian miracles. He does this by making use of the best available scientific knowledge of the day to show that the naturalists, in fact, know little about science. In other words, Mersenne is marshalling his knowledge of all branches of science to the defense of what he considers a key element in Christian doctrine, the concept of miracles.

Mersenne had good reason to be concerned about miracles. The founder of the Minime Order, St. Francis de Paule, was reported to have performed many miracles, both of healing and other kinds. Mersenne might understandably have felt that an attempt to explain away miracles was attacking a basic belief of his order.

At the same time, by his defense of miracles, Mersenne was helping to discredit one attempt at scientific explanation that was unsatisfactory. Italian Naturalists tried to explain too many phenomena, and in so doing presupposed a variety of occult powers of nature which they said must exist in order to explain all the phenomena that had been reported.⁶⁰ Mersenne examined each of these naturalistic explanations and then rejected them. To do

⁶⁰See for example, Pietro Pomponazzi, Les causes des merveilles de la nature ou les enchantements, trans. Henri Busson (Paris: Reider, 1930).

this, he made use of the kind of scientific reasoning that marks the beginnings of modern science. As a result, therefore, of his concern to defend his religion, he helped encourage the development of modern science. Instead of hindering this development, which is the usual interpretation of the relationship between science and religion, the latter was responsible, in this case, for promoting it, and for rejecting unsatisfactory alternatives. A brief examination of Mersenne's discussion will make this apparent.

The section on whether the existence of God can be proved from His works raises a question about a basic assumption that Mersenne had made in many of his "proofs" of the existence of God. In those proofs Mersenne had continually insisted that an examination of the world in which we live will lead to the conclusion that God exists.

The importance of this discussion of God's works for Mersenne is its relationship to miracles. According to Cardan, sublunar events are the effects of the stars, rather than of God.⁶¹ But, says Mersenne, if miracles can be explained naturally, it is unnecessary to attribute them to God. If, however, nothing exists in nature which can be the cause of miracles, then we must conclude either

⁶¹This reference to Cardan comes from Vanini, De admirandis, op. cit., p. 218, as do the other references to Cardan in this section. Mersenne simply repeats the volume and page references given by Vanini.

that there is some other cause of miracles beyond nature, or that there is no efficient cause. This latter explanation Mersenne finds himself totally unable to accept, and therefore does not consider seriously. It follows, then, by Mersenne's reasoning, that miracles are caused by God, provided that the possibility of a natural explanation can be excluded. Mersenne sets out, therefore, to prove that the explanations of miracles offered by Italian Naturalism are invalid.⁶²

Complicating the problem was the fact that both pagan and Christian miracles had been reported. Mersenne had already dealt with this by rejecting the truth of the reports of pagan miracles.⁶³ Since he realizes that this might also be done to Christian miracles, he begins by justifying the reliability of the accounts of Christian miracles reported in Scripture. For if any one of these miracles in which the Church believed, could be shown to have truly happened, then the need to explain them would immediately arise. Among the twelve reasons which Mersenne gives for accepting the accuracy of the reports of miracles found in the Scriptures, in the writing of the Church Fathers, and in Church History, are the following: scholars agree that the reports are true, prophecies and oracles

⁶²Quaestiones celeberrimae in Genesim, op. cit., col. 457.

⁶³Ibid., cols. 381-82, 462.

have come to pass as predicted, the Pentateuch, in which miracles are reported, is the oldest book in existence, and its very age attests its veracity. Since all twelve reasons are summarily discussed in one brief chapter, it seems obvious that he felt that most people would accept them as valid without an elaborate discussion.⁶⁴

The real problem for Mersenne was to prove that naturalistic explanations could not be used to explain away these miracles. In order to do this, he follows Vanini's discussion of possible explanations and attempts to show that those offered by Italian Naturalism were invalid, whether Vanini had accepted them or not. At this point, it is the possible explanations which interested him, rather than Vanini's attitude toward them. These explanations can be divided into two broad categories: natural events that are within man's power to control, and those that he can not bring about, but for which naturalistic explanations can be found.

First of all, it is possible that miracles and the appearance of angels are nothing more than stories, fabricated perhaps by princes in order to keep their people under control, or by priests to get money from the housewife.⁶⁵ Mersenne had already countered this argument, not simply by an appeal to authority, but by

⁶⁴Ibid., cols. 475-77.

⁶⁵Ibid., cols. 469, 471.

trying to establish the reliability of the accounts of miracles and angels.

Secondly, the naturalists claimed that miracles and the appearance of angels could be caused by man's use of mirrors to reflect an image, although they did not explain exactly how this could be done. Mersenne devotes several chapters to explaining how mirrors work, and to the laws of optics in general, in order to demonstrate that they could not be responsible for the appearance of angels. He points out that mirrors cast an image only in the line of reflection, and that a person must be directly in that line to see them. This means that mirrors could not have projected the image of the angel Raphael, who had been seen walking in the fields. Furthermore, if mirrors had been used, all sides of Raphael would not have been observable. He could not have been touched, and he would have been unable to speak or eat.⁶⁶

Just as the naturalists had suggested that the appearance of angels could be attributed to the use of mirrors, Giovanni Baptista della Porta suggested that they could be made to speak by transmitting the human voice over long distances by means of hidden pipes, or possibly by preserving the voice in pipes and releasing it whenever someone approached. For Mersenne, Porta's suggestion for

⁶⁶Ibid., cols. 470, 506-37.

carrying the human voice through pipes is an unsatisfactory explanation, since it would not produce the right results. For one thing, there are no pipes longer than one league in length, so the hypothesis can not be tested. Moreover, Mersenne cannot see how pipes can store words, and even if they could, how could such pipes put words into Raphael's mouth, when he moves about as he talks?⁶⁷

A third kind of explanation for miracles makes use of certain supposed properties of herbs, minerals or animals, to explain miracles of healing or the resurrection of the dead. These occult powers in nature were presupposed by the naturalists in order to explain many of the marvellous events reported in history, including possibly the miracles accepted by the Church. Mersenne had already rejected these marvellous accounts in Pliny and others, and thus had no need of inventing occult powers to explain them. Since these powers were likened by the naturalists to the power of the magnet, Mersenne includes a chapter discussing the latter and drawing upon William Gilbert's De magnete, the best information available at the time on this subject. Even though the magnet can suddenly draw iron to itself, it does not follow that other substances can suddenly expel infirmities from the body.⁶⁸ This is Mersenne's basic criticism of all attempts

⁶⁷Ibid., cols. 491-92.

⁶⁸Ibid., cols. 541-42.

at naturalistic explanations of miraculous cures. He insists that for medicines to work, whether they are derived from plants, animals or minerals, there must be time for them to penetrate to the part of the body where they are needed, and to cast out the internal enemies of health.

Another reason for rejecting occult powers in nature was Mersenne's refusal to accept the possibility of action at a distance. For that reason he is unwilling to accept the sympathetic unguent of Crollius (Oswald Croll), who said that his ointment gave off vapors that could operate even at a distance of many miles. Mersenne contends that even if the ointment did emit vapors, they would be dissipated before they reached a distant body.⁶⁹

For the same reason he rejects the suggestion that the spirits exhaled from a healthy man or child could bring health to someone who is ill. Moreover, the spirits never leave the body unless the vessels containing them are broken. (According to the medical theory of the time, the nerves and arteries carried the spirits or pneuma in the body.)

Other naturalistic explanations for miracles and the appearances of angels which could not be attributed to a deliberate action on the part of man were advanced by the naturalists. According to them, miraculous happenings

⁶⁹Ibid., col. 566.

could, for example, be the result of the imagination. Mersenne argues that the imagination could have no curative power, for fantasy or imagination is in the mind alone, and not external, and cannot therefore affect another person, or cause an external event. It cannot, for example, account for the curing of an illness or for the killing of the firstborn children of the Egyptians at the time of the Exodus.⁷⁰

As for the appearances of angels, one suggestion was that they were caused by vapors in graveyards given off by dead bodies, even after burial. This argument is also rejected by Mersenne on the grounds that such vapors could not walk about as Raphael is reported to have done; nor would they have always the same recognizable appearance. Besides, says Mersenne, what vapor could foretell the future?⁷¹

As a naturalist, Vanini rejected the existence not only of angels, but also of demons.⁷² Mersenne believed in both, for they were both reported in Scripture and in Church history. He believed that angels were the intelligences that moved the planets. They were a part of the natural order, and were accordingly limited to producing things naturally, and could not therefore, by

⁷⁰Ibid., col. 565. ⁷¹Ibid., cols. 495-96.

⁷²Vanini, Oeuvres, op. cit., p. 237-48.

themselves, perform miracles. God, however, could use them as intermediaries to perform miracles, just as he made use of other natural things, such as water in baptism, or oil in confirmation, to produce natural effects.⁷³

Demons, likewise, insists Mersenne, could do nothing beyond the power of nature. They could play no role, for example, in resurrecting the dead, because only God has the power to control the soul which has been separated from the body.⁷⁴

By eliminating all the naturalistic explanations for miracles suggested by the Italian Naturalists, as represented by Vanini, Mersenne felt that he had proved conclusively that the only possible explanation was a supernatural one, and that miracles were caused by God alone.

Having dealt at length in sections five and six with the ideas of Vanini and the Italian Naturalists, and with the problems affecting science and religion arising out of these ideas, Mersenne follows these two sections with a Colophon, which contains a criticism of atheists in general, and which concludes the first part of Quaestiones celeberrimae in Genesim. He was apparently taken to task for this, because he found it necessary to

⁷³Quaestiones celeberrimae in Genesim, op. cit., col. 569.

⁷⁴Ibid., cols. 577-79.

write a second version to replace the first in most copies of the book. Most authorities have suggested that his estimate of the number of atheists in Paris alone at 50,000 was in large measure responsible for the first version's chilly reception. At any rate, this number was removed from the second version, so apparently he was persuaded to revise it.⁷⁵

In this concluding section, Mersenne again returns to the attack on Vanini. Although the latter's books are ostensibly a refutation of atheism, his counterarguments are so unconvincing, says Mersenne, that he succeeds only in helping to propagate those ideas which he affects to abhor.⁷⁶

In conclusion, then, Mersenne's major concern in the first part of Quaestiones celeberrimae in Genesim is to refute the ideas of the Italian Naturalist school of the 16th century, as represented in 17th century France by Vanini. Naturalism furnished a possible explanation of science. Its major weakness was that it tried to explain too many marvellous phenomena which had been reported by many writers. It was thus forced to postulate occult powers in order to provide naturalistic explanations for

⁷⁵Ibid., cols. 669-74. We shall adopt the suggestion of Lenoble, *op. cit.*, p. xiii, and designate the column numbers of the first version of the Colophon by an asterisk (669* - 674*).

⁷⁶Quaestiones celeberrimae in Genesim, op. cit., col. 671*.

these events. Mersenne, on the other hand, eliminated the need for naturalistic explanation of miracles, by clinging to the belief that Christian miracles could have no such naturalistic explanations, and by rejecting the truth of the accounts of pagan miracles. The conjectures of the naturalists, therefore, were unnecessary, and, we might add, when investigated, did not hold up to a more scientific examination. Having rejected the validity of the naturalists' attempts at science, Mersenne then turns his attention to the examination of other possible explanations of the natural world.

CHAPTER III

GENESIS AND SCIENCE

The second major part of Quaestiones celeberrimae in Genesim is a commentary on the book of Genesis. This was the part of the Old Testament most frequently selected for scriptural exegesis during the 16th and 17th centuries.¹ A great quantity of traditional material associated with the book of Genesis but not actually found within it was popular during the Renaissance and provided many literary themes, such as the material used in Milton's Paradise Lost.²

Arnold Williams' discussion of the commentaries on

¹Arnold Williams, op. cit., p. 7, Williams counted 35 commentaries in Latin devoted exclusively to Genesis between 1527 and 1633, "the period when the most and best commentaries were written." To this number we might add another, apparently overlooked by Williams, used by Mersenne, that of Ascanio Martinengo, Glossae magnae in sacram Genesim, in qua post diversas editiones voces, phrasesque Hebraicas calculatas, interpretationes, ac observationes literales, et mysticae, ex ducentis fere patribus depromptae, comprehensis cunctis iis, quae glossae, interlinearis, ordinariis locupletata, catenae, postillae, et appendices adnotarunt, ad declarandam sacram scripturam adhibentur: De patrum sententiis per catenas deductis iudicium fertur, et selectiores emergentes quaestiones cumulate disputantur (Patavii: Laurentio Pasquato, 1597).

²Williams, op. cit., p. 4.

Genesis in this period lists four reasons for the popularity of Genesis: (1) some authors planned to discuss more, but got no further, (2) the general interest in the study and interpretation of Scripture widespread in the 16th century, (3) Genesis is the record of the beginning of things, and (4) the popularity of literature based on themes from Genesis.³

For Mersenne, we may discount the fourth motive, for he was never much interested in literature. His concern was much more that of an apologist seeking to prove the credibility and desirability of the Christian religion.⁴

Aristotle, whose works had formed the basis for much of science during the medieval period, was now under heavy fire from all quarters. The medieval synthesis was being attacked on one side by those who wanted to return to the original Aristotle, as we have seen in the previous chapter on Italian Naturalism. New developments in science were also putting a strain on the medieval synthesis, and Aristotelian science was crumbling under the impact, causing a crisis for theology in the first few decades of the

³Ibid., p. 9.

⁴See the discussion of R. P. Charles Chesneau, Le Pere Yves de Paris et son temps, 1590-1678 (Paris: Société d'Histoire Ecclésiastique de la France, 1946), II, 14. Chesneau places Mersenne in the category of a specialist apologist who tries to prove a particular point of faith, i.e. the existence of God.

17th century.⁵

Regardless of its interpretation, Scripture, in this period, was generally believed to be accurate.⁶ Since Genesis was the book which contained the most about the natural world, it could perhaps provide an element of certainty at a time when other sources of knowledge had become unreliable. Genesis, or God's Word, contained a discussion of nature, or God's works.⁷ Commentaries on Genesis provided an opportunity for expositions of scientific theories. "The exegetes of the sixteenth and seventeenth century incorporated a larger amount of what they took to be science than any exegetes before or since their day. They took Genesis far more as a literal, rather than as a merely religious or even literary account than have commentators since their time."⁸ While there were commentaries that had an anti-scientific bias, this is not true of Mersenne's, of course, whose "name shines much brighter

⁵Henri Gouhier, "La Crise de la Théologie au Temps de Descartes," Revue de théologie et de philosophie, IV (1954), 19-54.

⁶See the discussion of how Scripture came to be accepted as true propositional statement by Protestants in this period. John Dillenberger, Protestant Thought and Natural Science (Garden City, New York: Doubleday and Company, 1960), pp. 96-99.

⁷Dillenberger, ibid., p. 60. Williams, op. cit., p. 174.

⁸Williams, ibid., 176.

as a scientist than as an exegete."⁹

Mersenne is unique among the commentators in making use of much of the new science. While many of the earlier exegetes had recognized the value of science to exegesis, they could only draw upon Aristotelian science. After Mersenne, scriptural commentary and physics were regarded as separate fields. "With the exception, then, of Mersenne, the science of the commentaries is dominantly Aristotelean, for when Aristoteleanism passed out of the intellectual picture, science largely passed out of the commentaries."¹⁰ As the new science began to develop, such an immense amount of knowledge was needed to master it that few had the courage to try. The study of the Scriptures likewise was growing ever more complex, in the number of languages needed, and in the development of historical criticism, as evidenced by the work of Richard Simon and Spinoza in the latter half of the century. Thus the two studies tended to diverge, a trend noticeable in the works of Mersenne himself. His later writings were books devoted primarily to science, on the one hand, and highly technical or mathematical, and on the other, the uncompleted manuscripts on Genesis and on the Evangiles, which dealt much less with the kind of scientific topics found in Quaestiones celeberrimae in Genesim.

The preface to Quaestiones celeberrimae in Genesim

⁹Ibid., p. 179.

¹⁰Ibid., pp. 180-81.

explains why Mersenne was interested in this subject. He wanted to discuss contemporary developments to show that there should be no real conflict between science and religion. He wanted to refute atheists, magicians and deists, whose ideas were beginning to spread. They had created the impression that the new developments in science were inimical to the Catholic faith. In Mersenne's opinion, this did not have to be so, even though some who were working with the new developments strayed into heresy and from there into deism or atheism. Vanini, as indicated above, was such an example. Instead, Mersenne insisted, the new scientific ideas could be acceptable to Catholics and he hoped in this book to demonstrate that acceptability to many who otherwise might not have realized this. He was particularly anxious to show that a knowledge of the sciences did not make one an atheist or deist, and that good Catholics could acquire such a knowledge and remain good Catholics.¹¹

One charge leveled against Catholic theologians was that they were too bound to Aristotle and followed him slavishly even when experience and phenomena proved differently. Mersenne rejects this criticism, which, he says, was made by Campanella, Bruno, Telesio, Kepler, Galileo and Gilbert, among others. The theologian, Mersenne

¹¹Quaestiones celeberrimae in Genesim, op. cit.,
p. e.

insists, is ready to accept everything, whether it be that the earth moves, that the sun, planets and stars are made from the four elements, that the world has not only a vegetative, sensitive and rational soul, but even the possibility of salvation, and that all creatures have a magnetic virtue, if it is revealed by God directly or through the Church. Some of these ideas he intended to examine in this and later books, giving the various arguments, including not only those based on physical and logical demonstration, but also those drawn from theology and Scripture.¹²

Mersenne was willing to examine new ideas, and to reject Aristotle if it seemed necessary. He did not, in fact, accept Aristotle's teachings in toto. This, he felt, was the error of the Italian Naturalists. Aristotle had had to be modified to be compatible with Christianity.¹³ Since Mersenne had been educated by the Jesuits, he undoubtedly had adopted their attitude toward Aristotle and toward St. Thomas's scholastic modifications. The Jesuits were not above criticizing certain ideas of Aristotle and St. Thomas, and were willing to accept a new philosophy.¹⁴

Mersenne's real commitment was to the Catholic faith, and not to any particular support for its theology.

¹²Ibid.

¹³See chapter two above.

¹⁴See above, pp. 6-9.

He freely submitted all his writings to the Church and to the Pope as its visible head for their approval.¹⁵

Mersenne thought that the book of Genesis was valuable because it provided certainty about the creation of the world, and that attention should be paid to it at a time when ridiculous ideas about creation were spreading.¹⁶ While he attempted to make use of science to explain the Scripture and used religious ideas to reject certain attempts at scientific explanation, Mersenne was nevertheless well aware that the purpose of the Bible was not scientific. He pointed out that Christ did not come to teach astrology, nor did Moses deal with philosophical problems.¹⁷

Since he was writing a Biblical commentary, it was fitting that fairly early in his discussion a few remarks should be devoted to the various ways of interpreting Scripture. This was particularly apt since several problems concerning the relation of faith to the Scriptures had arisen. Our faith, he says, does not ultimately rest on this or that passage of Scripture, nor on the whole of Scripture, as Calvin and Luther insist on the one hand, nor does it rest on internal and immediate revelation, nor

¹⁵Quaestiones celeberrimae in Genesim, op. cit., p. eiii verso.

¹⁶Ibid., cols. 690, 715.

¹⁷Ibid., p. e verso.

on the internal testimony of the Holy Spirit, as Schwenckfeld insists on the other. But it rests on the Church, which gives the rule of faith, or on the Scripture as explained by the Church.¹⁸

There are, he says, two senses in which Scripture can be interpreted, the literal and the spiritual. The former deals with the obvious meaning of the words themselves, the latter with the thing symbolized by the words. The latter interpretation is necessary, for whatever does not immediately appear to refer either to good moral standards, or to the truth of faith, must, insists Mersenne, be taken metaphorically. For example, when Caiphas said, "It is expedient that one man die for the people,"¹⁹ he spoke in a double sense, for his words conveyed the idea that Jesus should be killed, but, says Mersenne, the Holy Spirit, speaking through these words, intended more than Caiphas knew.²⁰

The literal sense of the words was thus not the only sense, but the basis for the spiritual sense. The latter comprised allegorical, moral and anagogical interpretations. These can be explained very quickly by the little poem which Mersenne gives as a mnemonic device:

¹⁸ Ibid., col. 840.

¹⁹ John 11:49.

²⁰ Quaestiones celeberrimae in Gensism, op. cit., col. 695.

The Literal teaches the deeds,
 The Allegorical what to believe,
 The Moral what to do,
 The Anagogical where the goal.²¹

These last three are vitally important, for, as Paul warned, "the letter kills, but the spirit gives life."²²

In order to elucidate these methods of interpretation, Mersenne borrowed an example from Sixtus Senensis, who explained the term "water" in four different ways: First, there was the literal meaning; water, as an element, which God ordered collected together in the first chapter of Genesis. Secondly, water was used allegorically to mean baptism. Thirdly, water had a moral interpretation; the phrase "fire and water" was used to mean tribulations, or, alternatively, the wisdom and prosperity of the world, which, when tasted, failed to satisfy. Lastly, water could be taken in the anagogical sense to mean the blessed life.²³

Mersenne felt it necessary again to warn that these interpretations should contain only what had been defined by the Church or approved by the Church Fathers, or what was clearly confirmed by other passages in Scripture.²⁴

²¹Ibid.

²²II Cor. 3:6.

²³Sixte de Sienne, Bibliotheca sancta ex praecipuis catholicae ecclesiae autoribus collecta (Venetiis: F. Franciscium, 1566), cols. 76-80. Much of Mersenne's discussion of scriptural interpretation at this point is taken from Sixte's book. Quaestiones celeberrimae in Genesim, op. cit., cols. 695-701.

²⁴Ibid., col. 695.

He felt the need to stress this point since there was a tendency in some quarters to try to make too much use of metaphor and allegory. The Cabalists, who based their ideas on the secret writings of the Rabbis, thought that almost every letter or verse of Scripture revealed a mystery. But the interpretations they suggested were not always consistent with Catholic doctrine.²⁵

Although Mersenne was aware, then, of the traditional methods of interpreting Scripture, he made much greater use of the humanistic approach which drew heavily on linguistic, philological and historical knowledge. He gives each passage of Genesis in Hebrew, Greek and Latin.

In his unpublished manuscript on the New Testament, Mersenne gives several rules the application of which, he thought, would prevent any erroneous interpretations of Scripture. These rules are summarized as follows:

1) Whatever God explains to us through Scripture, or in any other way, ought to be conformable to the principles of nature.

2) Passages of Scripture ought not to be inconsistent with any other passages, nor with any article of faith, nor with orthodox doctrine.

3) The explanations of Scripture ought not to be contrary to logic, to geometry, or to other axioms and

²⁵Ibid., col. 701. See Chapter IV below for a discussion of Cabalism.

demonstrated conclusions.

4) The principles, axioms and conclusions of the arts and sciences ought not to be corrected from Scripture, which was not given to us to use for the sake of learning, but to counsel our salvation and to explain God's will. They labor in vain who attempt to derive Physics or Mathematics from Scripture alone.

5) The interpreter ought to be familiar with the languages in which the Scriptures were first written.

6) All the figures and patterns of rhetoric and grammar should be used to expound the Scriptures.²⁶

These were undoubtedly the rules of interpretation that Mersenne tried to follow in writing his commentary on Genesis.

The need to interpret Scripture so that it would not be inconsistent with the principles of nature, or with the concepts of science had already created a problem. The statement in Genesis that God had made two great lights, the greater light to rule the day, and the lesser light to rule the night, was difficult to reconcile with scientific theory. Astronomers had long since realized that the Moon was one of the smallest in size of the planets and that it shone by reflected light. This apparent conflict between

²⁶"In novum testamentum," Bibliothèque Nationale, fonds latin, 17261, pp. 3-6. The pagination in red was added in 1869.

science and a statement of Scripture had been reconciled by the "theory of accommodation."²⁷ Mersenne accepted the explanation that Moses, the Scriptures, and even God Himself, spoke in such a way merely to accommodate themselves to man's understanding.²⁸ The theory of accommodation could have been applied to the newer scientific theories of the day, such as Copernicanism. As will be apparent, however, in a discussion of Mersenne's analysis of Copernicanism, other factors intervened to cause him to put aside this possibility.

Some of the questions relating to various interpretations of Genesis are discussed by Mersenne in terms of humanistic knowledge. Question two, for example, considers whether the mystery of the Trinity can be proved from the words of the first verse of Genesis,²⁹ and question three, the various ways in which the word "heaven" is used in the Scriptures.³⁰ Other questions, however, provide him with an opportunity for giving a scientific discussion of topics introduced by verses in Genesis. Question five, for example, is a long discussion of the physics and nature of light, introduced by the third verse,

²⁷Williams, op. cit., p. 177.

²⁸Quaestiones celeberrimae in Genesim, op. cit., col. 1005.

²⁹Ibid., cols. 676-81.

³⁰Ibid., cols. 681-737.

"and God saw the light, that it was good."³¹

Question seven deals with a subject that had aroused a great deal of interest during the latter part of the 16th and the early part of the 17th centuries. Were the heavenly spheres, which were used to account for the motion of the stars and of the planets in the Aristotelian and Ptolemaic astronomical theories, solid or fluid? Here was an area where controversy had developed as a result of the challenging of older theories. Mersenne discusses this controversy, giving first the reasons used to support both possibilities.³² He follows this with an article refuting the idea that the heavenly spheres are liquid, and including in the discussion a long digression on comets, cited by some as evidence that the spheres are fluid.³³ Then he refutes the argument that they are solid,³⁴ and concludes by giving his own answers to the question.³⁵

He wanted to deal with this topic, which he felt was one of the most widely discussed questions of the century, so that all the passages of Scripture containing discussions of the heavens might be better understood. He intended to show the opponents of the Church that Catholics did not assert things to be a matter of faith if the Church

³¹Ibid., cols. 737-92.

³²Ibid., cols. 811-15.

³³Ibid., cols. 815-32.

³⁴Ibid., cols. 833-41.

³⁵Ibid., cols. 842-850.

had not declared them so. For the articles of faith, he was sure, did not rest on mere opinion, but rather on eternal truths. Whether the heavenly spheres were solid or fluid, therefore, was a matter that was open to discussion and not a matter of faith.³⁶

He recognized that the problem arose because many of the most famous astronomers and philosophers of his century were beginning to reject the Scholastic idea that the heavenly spheres were solid, and to insist that the celestial phenomena could be explained more easily by the hypothesis that the spheres were fluid. But since the opposite opinion was a commonplace idea held by most mathematicians, philosophers and theologians, and was thought to be based on both reason and Scripture, it was indeed worthy of examination.³⁷

The comets which appeared from time to time in the 16th and 17th centuries are cited by history texts today as one of the major reasons for rejecting the idea that the heavenly spheres are solid. This reason presupposes our present-day understanding and explanation of the nature and paths of comets. In the early 17th century, however, there were two hypotheses put forward to explain comets. Because one explanation fitted the Aristotelian-Ptolemaic cosmology and the other the Copernican, Mersenne

³⁶Ibid., col. 811.

³⁷Ibid., col. 814.

frankly states that the appearance of comets added little or nothing to the attempt to prove the fluid nature of the heavenly spheres.³⁸

The explanations for comets, according to Mersenne, fall into two categories. Comets are either celestial and composed of some heavenly material, or are due to some earthly exhalations rising into the sky. Some of those who advocated the former, such as the Pythagoreans and Apollonius, said that comets are stars, others, such as Anaxagoras and Democritus, that they are light given off by the movement of the planets, and still others, such as Cardan, that they are merely reflections from the celestial sphere made visible by the illumination of the Sun.³⁹

Those choosing the second type of explanation, that comets were of an earthly nature, said, for example, that they consist of a hot exhalation of smoke and oil which begins to burn in the upper regions, or that they are, as Scaliger suggested, an exhalation drenched by light from the Sun. Comets were thought to be exhalations of some kind by Aristotle, Averroes, St. Thomas, and others, including Regiomontanus, who said that the comet of 1475 was below the sphere of the Moon, and Voghelinus, who thought the same about the comet of 1532.⁴⁰

³⁸Ibid., col. 823.

³⁹Ibid.

⁴⁰Ibid., cols. 823-24.

The comet of 1577, however, was said to have been three times higher than the Moon. This was given as an argument supporting the idea that the heavens were fluid.⁴¹ For Mersenne, however, the argument was not decisive, since he considered the astronomical data so unreliable at that time that he refused to take a stand on either position.⁴²

After discussing the arguments taken from astronomy and physics as well as those derived from interpretation of Scripture, Mersenne gives his own conclusions. In an attempt to show that he is free to do so, he states that faith does not compel adoption of either theory, for whenever one side refers to the Scriptures, the other refutes the interpretation and offers his own. And, since Scripture is not conclusive in this matter, it is left to the judgment of reason.⁴³

But here Mersenne found himself unable to decide. For the present, he says, we cannot know whether the heavens are solid or fluid. We can only conjecture in one way or another, according to whatever seems to us more probable.⁴⁴

He first concluded that the heavens in which the stars move are possibly fluid like air, and that a part has coalesced to form the stars, which are moved by their own motion. It is possible by this theory, he thinks, to

⁴¹Ibid., col. 812.

⁴²Ibid., col. 847.

⁴³Ibid., col. 842.

⁴⁴Ibid., col. 845.

explain the movements, positions and characteristic features of the stars, the movements and heights of the comets, of the new stars, and of other celestial phenomena.⁴⁵

This line of reasoning does not require the heavenly spheres to explain the motions of the stars and the planets. The stars could simply contain their own motive power within themselves. Elimination of the spheres would fit in with the philosophic principle that entities should not be multiplied unnecessarily. It likewise is easier to explain the appearance of new stars and the motions of comets. Indeed, the reason that we have supposed heavenly spheres to be solid, says Mersenne, and invented epicycles and other circular motions, is to explain the progression, stopping and retrograde motions of the planets. Nevertheless, he says, all of the spheres, quadrants, regions of the Zodiac, equinoxes and other astronomical figures have been invented by astronomers in order to facilitate their efforts to determine the course of the planets. When new phenomena must be accounted for, they simply construct new circles. But such circles are not necessarily in the heavens.⁴⁶

Mersenne was apparently quite willing to accept the fluid theory, then, if he could be given more evidence to support it. His second conclusion, however, is that it seems more probable that the eighth heaven, in which the

⁴⁵Ibid., cols. 843-44.

⁴⁶Ibid., cols. 843-45.

stars rest, is solid. It does not seem to him absurd also to assume that the remaining heavenly spheres containing the planets are likewise solid.⁴⁷

The eighth sphere, or the Firmament, can be said to be solid for several reasons relating to the interpretation of Scripture. For one thing, the Firmament is said to divide the waters from the waters.⁴⁸ In order for it to do this, it must be solid, for a solid body is needed to sustain water. Also, the Scriptures use the Hebrew term Rakia in reference to the firmament, and this term implies solidity. Then, too, there are references to the heavens as a vault, a skin, or a tent, all of which also suggest something solid.⁴⁹

As for the remainder of the heavens, several recently discovered phenomena were often cited to show that they are not solid. But Mersenne feels that they are not conclusive. These phenomena are: (1) the Moon, seen through the Batavian tube, is uneven, rough, and pitted with valleys, so that it is judged to be another earth, with many cities and mountains, (2) comets are seen to be higher than the Moon, (3) the Sun has spots, (4) Mercury and Venus have phases and revolve around the Sun as a center, (5) Jupiter has four planets which circle round

⁴⁷Ibid., col. 845.

⁴⁸Gen. 1:7.

⁴⁹Quaestiones celeberrimae in Genesim, op. cit., cols. 845-46.

it, and Saturn has two comets which orbit like satellites.⁵⁰

In response to this list of astronomical conclusions, Mersenne first makes the point that we cannot rely completely on the observations of the astronomers, since they disagree among themselves. Some conclude that the location of the comets is below the Moon, others that it is above the Sun or even above the Firmament. Their observations are simply not accurate enough because of defects in their instruments, in their reasoning, and because of inconsistency in their observations. As a result, says Mersenne, we can suspend our judgment on many of these questions.⁵¹

Secondly, he says, we can reject their hypotheses, just as St. Bonaventura and Fracastoro, for example, have rejected epicycles and eccentrics as explanations of planetary motion. Also, there are several "sects" of astronomers, such as the followers of Ptolemy, of Copernicus and of Brahe, whose theories vary greatly and yet explain the phenomena almost equally well.⁵²

The astronomical phenomena already mentioned are also subject to a different interpretation, so that they do not necessarily prove a particular theory. The roughness and irregularities of the Moon, for example, do not

⁵⁰Ibid., col. 846.

⁵¹Ibid., col. 847.

⁵²Ibid.,

prove that it is subject to corruption, for an incorruptible body could have any figure.

Mersenne is aware that there is no agreement about comets. Minute differences in observations, arising perhaps from parallax, could cause great deceptions. Some comets were undoubtedly sublunar, as various sources testify, and it is not improbable that they were exhalations from the earth. It is also possible that if God wished to make some changes in the incorruptible heavens, by introducing comets as a sign to men, he could do so. God could easily make these phantom comets penetrate even solid heavenly spheres. Other explanations for comets found above the Moon are also possible.

Although Mersenne accepts the fact of Sun spots, which could arise either from chance collections of opaque corpuscles moving around the Sun, or from light reflected and refracted from the Sun, he does not feel that they prove that the heavenly spheres are not solid.

Nor does he believe that because Mercury and Venus are said to orbit around the Sun, the heavens are, therefore, not solid. For one thing, Tycho's hypothesis about their motion has not been accepted by everyone. For another, Tycho himself admits that there are errors in his observations.

The same can be said about Jupiter and Saturn. The reports about them could all be caused by errors in

observations. Much more exactitude is required before the learned can be won over by these ideas.⁵³

Part of Mersenne's discussion of the solid or fluid nature of the heavenly spheres raised the question of the Copernican theory of the universe. Although he postponed consideration of it at this point, he discussed it in a later question.

One of the most revolutionary scientific ideas ever put forward was published in 1543 by Nicolas Copernicus in his De revolutionibus orbium.⁵⁴ Copernicus attempted to overthrow a theory of the universe that had been accepted almost universally until his day. This was the assumption that the Earth was at rest in the center of the universe and that all the heavenly bodies revolved around it. Copernicus had suggested that the Sun was in the center, and that the Earth, along with the other heavenly bodies, revolved around it. Because Copernicus' idea upset so many firmly held convictions, few were inclined to accept it at first. Mersenne's discussion of the question, published exactly eighty years after the appearance of Copernicus' book, demonstrated some of the

⁵³Ibid., cols. 847-48.

⁵⁴Copernic, Nicolas, Astronomia instaurata, libris sex comprehensa, qui de revolutionibus orbium caelestium inscribuntur. Nunc demum, post 75 ab obitu authoris annum integritati suae restitua, notisque illustrata, opera et studio D. Nicolai Mulerii (Amstelodami: excud. W. Janssonius, 1617).

difficulties that faced those who were considering the problem.

Mersenne presents first some twenty-eight arguments in support of the hypothesis that the Earth moves and that the sphere of the stars is at rest.⁵⁵ Then he gives arguments supporting the opposite point of view.⁵⁶ This is followed by an article discussing the relationship of this question to religion.⁵⁷ He concludes with a refutation of the twenty-eight arguments supporting the Copernican hypothesis.⁵⁸

The first idea that Mersenne cites in support of the Copernican hypothesis that the Earth is in motion is based on the relativity of motion. It seems to us, he says, that the Earth stands still and that the heavenly bodies move around it. But, according to this first argument, our eyes are deceived; it is actually the Earth which is in motion, and this explains the motion we think we see in the heavens. An analogy is used to make this clear. It seems to someone standing on a ship which is sailing away from a harbor or along a river that the ship is standing still, while the harbor is receding into the distance or the riverbank is moving past.⁵⁹

⁵⁵Quaestiones celeberrimae in Genesim, op. cit., cols. 879-94.

⁵⁶Ibid., cols. 893-902.

⁵⁷Ibid., cols. 901-910.

⁵⁸Ibid., cols. 909-920.

⁵⁹Ibid., col. 882.

The argument goes further, however, and moves from the possibility of uncertainty in sight to complete scepticism about the possibility of all knowledge. Mersenne lists ten arguments for the sceptical attitude, given by the ancient philosopher Sextus Empiricus, and dismisses them with the comment that scepticism is "foolish and frivolous", for "to what end does sense and intellect exist, to what end does the desire for natural knowledge exist, unless we can know something."⁶⁰ The question disturbed Mersenne more than is apparent here, for two years later he published a two volume work attempting to give a more satisfactory answer to scepticism.⁶¹

Mersenne is quite willing to agree that we can and do make mistakes. In fact, he lists several reasons for this: inexperience, malfunction of the sensory organs, psychological aberrations, or poor education among others. However, in the question of whether or not the Earth moves, our eyes, he says, do not deceive us. If the Earth moved swiftly through vast distances, as the Copernican theory claimed, a person who leaped into the air, he insists, would not fall back onto the same spot from which he jumped. He does not agree with the explanation that the person who jumped moves with the Earth, because he does not accept the idea that there is a magnetic virtue in the Earth which

⁶⁰Ibid., col. 910.

⁶¹See Chapter IV below.

draws all things to it. He thinks this idea of William Gilbert's purely imaginary. Since we can clearly see what happens when someone leaps into the air, Mersenne alleges that our eyes are not deceived.⁶²

Another argument given by Mersenne in support of the Copernican system was that the planets were seen to revolve around the Sun at progressively slower speeds the farther they were from the Sun. For example, the time taken for the Earth to revolve around the Sun is 365 days. This is between the 225 days taken by Venus and the 687 days needed by Mars. Of these three planets, therefore, Vanus is nearest the Sun, the Earth is farther away, and Mars is the farthest away. The stars, being the farthest removed of all from the Sun, would consequently have little or no motion. Mersenne rejected this theory, since he believed that the stars made a complete revolution around the Earth in just twenty-four hours.⁶³

To this last idea, that the stars revolved around the Earth every twenty-four hours, the Copernicans replied that this would require too rapid a motion, and that it was impossible for such a vast mass of stars to be carried so swiftly around so insignificant an Earth. For Mersenne,

⁶² Quaestiones celeberrimae in Genesim, op. cit.,
col. 911.

⁶³ Ibid., cols. 891, 892, 915.

such speed is not absurd, but awesome.⁶⁴

Tycho Brahe had propounded a compromise theory between the Aristotelian and the Copernican. In it the Earth was still considered at rest in the center of the universe, and the Sun rotated around it. The planets, however, rotated, not around the Earth, as in the Aristotelian theory, but according to Tycho, around the Sun, as in the Copernican. Thus he hoped to combine the best of both systems. As for the stars, they continued, in his view, to revolve around the Earth. But, answered the Copernicans, why is it not just as easy to believe that the stars, like the planets, revolve around the Sun. Merseenne was unwilling to commit himself unquestioningly to the Tychonic system, although he thinks it certainly has merit, because he feels that it has not yet been proved. It will take centuries of observations, he thinks, before it can be confirmed.⁶⁵

Other arguments relate more specifically to the Aristotelian conception of the universe and are less related to astronomical measurements than some of those we have just discussed. It was suggested, for example, that since the starry heavens were incorruptible, they should not be subject to motion, since motion implies corruption.⁶⁶

⁶⁴Ibid., cols. 885, 890, 913-14.

⁶⁵Ibid., cols. 891, 915.

⁶⁶Ibid., col. 882.

Mersenne gives two answers to this. In the first, he suggests that it is possible that the sphere of the stars is subject to corruption. The Scriptures say that on the Last Judgment Day, the heavens shall perish.⁶⁷ In the second, he says that motion does not necessarily imply corruption, for the angels move and they are not corrupt.⁶⁸

Another argument claims that the universe is infinite and thus cannot rotate around the Earth. Mersenne counters this by reaffirming his belief in a finite universe.⁶⁹

The remaining arguments for Copernicanism are similarly answered by Mersenne who denies the basic premise on which they are based. The very brief discussion, amounting in some cases to little more than a bare mention of the idea in one or two sentences, which Mersenne devotes to each of them, and an equally brief rejection is an indication that Mersenne did not find them convincing enough to devote much attention to them. On the other hand, the last argument which raises the question of the relationship of the Copernican hypothesis to religion, is discussed at length. Before dealing with this problem, however, let us

⁶⁷ Psalms 101:27; 2 Peter 3:10.

⁶⁸ Quaestiones celeberrimae in Genesim, op. cit., col. 912.

⁶⁹ Ibid., cols. 893, 916.

consider briefly the reasons Mersenne gives for rejecting the idea that the Earth moves.

Following his discussion of the arguments put forward in support of Copernicanism, Mersenne gives other arguments opposing it. If, he says, we suppose the Earth to be rotating on its axis, something falling through the air perpendicularly toward the ground must be affected proportionally by the same circular motion. But Mersenne could find no acceptable explanation of how this circular motion could be imparted to the falling stone, so that it would appear to fall perpendicularly and yet in actual fact be rotating with the Earth. He could find neither an internal source of motion nor an external one, unless it were caused by God acting through a continuous miracle. This, he felt, was a strong objection to the theory, even though Copernicus had insisted that it was a perfectly natural motion.⁷⁰ The principle of inertia had not yet been developed, and neither Mersenne nor Copernicus makes use of the idea of impetus.

Mersenne then lists the following reasons for not accepting the idea that the Earth moves. We ought to respect the hypotheses of ancient authorities unless manifest reason or experience compels us to reject them, and he does not believe that in this case we are so compelled.

⁷⁰Ibid., cols. 893-95.

Since the stars were created to serve men, it is fitting that they move rather than that man does. There are no phenomena that are better explained by supposing that the Earth, and not the heavens, moves. Since the Earth is the center of the world around which all heavenly bodies seem to move, it ought to be motionless. Since motion is attributed to the planets, why not also to the stars, rather than to the Earth? If the Earth moved, arrows and balls fired straight up into the air ought not to return to the same spot.⁷¹

Despite Mersenne's discussion of all the arguments for and against the Copernican thesis, he believes that there is not one given by the proponents of one view that the proponents of the other cannot refute. Although there is no irrefutable demonstration that he can use to persuade the Copernicans that they are wrong, their arguments, he feels, are not convincing. Furthermore, since a Congregation of Cardinals has held against the Copernican theory he concludes that its supporters ought to be persuaded to yield.⁷² This leads us to his discussion of whether the Copernican view could be considered heresy.

Mersenne defines heresy as doubting, with deliberate willfulness and temerity, those things which the Church declares to be beliefs. He defines error as denying something

⁷¹Ibid., col. 896.

⁷²Ibid., cols. 901-902.

which, even though it is not a matter of faith, is plainly deduced from faith. From this he concludes that the idea that attributes motion to the Earth is plainly neither heretical nor an error in faith, since the Church has not yet declared its belief on this point.⁷³

Now is the Copernican theory clearly incompatible with Scripture. Since the Church has not defined the teaching of the Bible on this point, Biblical statements about the heavens should be taken literally, although in some cases the literal interpretation may lead to an absurd conclusion. For example, we find references to the "hand of God". Such statements must obviously be taken metaphorically. According to the theory of accommodation which we have already discussed, we can assume that Scriptural statements which seem impossible to reconcile with the Copernican astronomy, such as "the Earth forever stands," were made because God was accommodating himself to man's knowledge.⁷⁴

The Copernican theory, then, says Mersenne, cannot be considered either heresy or error, and it is not impossible to reconcile it with the Scriptures. It should nevertheless be condemned as temerity.⁷⁵ Mersenne's definition of temerity is the asserting of an opinion

⁷³Ibid., cols. 901,916.

⁷⁴Ibid., cols. 902,917.

⁷⁵Ibid., col. 904.

which challenges without reason the unanimous consensus of the Doctors of the Church.⁷⁶ Since he does not find the Copernican arguments convincing, and since the theory had been condemned by a Congregation of Cardinals, Mersenne concludes that Copernicanism must fall into this category.

If we compare Mersenne's discussion of Copernicanism with his discussion of whether or not the heavenly spheres are fluid, we find that he comes to different conclusions in each case. In the latter problem, he discusses the arguments for and against, and finding neither completely convincing, he chooses the one which seems to him the more probable. With Copernicanism, however, he examines the arguments for and against, finds neither convincing, and decides definitely against it. The major reason for this was that the Church had taken a stand on Copernicanism while it had not done so on the possible fluidity of the spheres. Since this influenced Mersenne's opinion of Copernicanism at this time, and since he was later to reverse this opinion, let us examine his attitude toward the Church decree, which he quotes in full.

The decree censures three books, which advocated "that Pythagorean doctrine, which is false and entirely contrary to the Holy Scriptures, concerning the motion of the Earth and the immobility of the Sun." In order that

⁷⁶Ibid., col. 901.

such ideas would not spread further "to the prejudice of Catholic truth," two of the books, Copernicus' De revolutionibus orbium, and Didacus à Stunica's On Job, were "suspended until corrected". The third book, the Letters of Father Paolo Antonio Foscarini, which attempted to show that the theory that the Sun is in the center of the world and that the Earth moves is consistent with Scripture, was "entirely prohibited and condemned."⁷⁷

By merely suspending until corrected the work of Copernicus and Didacus à Stunica, while at the same time completely suppressing that of Foscarini, the Congregation, says Santillana, was making a distinction between a scientific hypothesis and theological interpretation. This prohibition, he says, was also "issued by the secondary Congregation of the Index and in forma communi without higher indorsement." All this, Santillana maintains, "was profound strategy born of reflexes of prudence - so profound, indeed, that it remained hidden to most contemporaries, who considered that anything declared in Rome to be false and altogether opposed to Scripture is as good as dogmatically prohibited."⁷⁸

⁷⁷Ibid., col. 904. See Giorgio de Santillana, The Crime of Galileo (Chicago: University of Chicago Press, 1955), p. 123 for an English translation of the decree. Ibid., pp. 98-102 for a discussion of Foscarini's book, and p. 28n for a comment on that of Didicus à Stunica.

⁷⁸Ibid., pp. 123n-24n.

Mersenne, however, was one of those contemporaries who was well aware of the nuances of the situation. Although he concludes immediately following the decree that "it is certain that the Earth is immobile," this does not mean that the theory must be abandoned.⁷⁹ It is still possible to make use of it, provided it is not presented as a true hypothesis, in the same way that theologians explain many valuable theological ideas by supposing that God is not infinite or just. In this way a truth can be extracted from error. We cannot teach, however, that the Earth in fact moves in a circle, since the Congregation declares that doctrine contrary to Scripture. Even though it has not been condemned as heresy, he says, no other demonstration is now needed by Catholics.⁸⁰

One of the arguments in favor of the Copernican hypothesis had raised the possibility that the various branches of the Church could err. In answer, Mersenne admits that the Doctors could err in their knowledge of certain philosophies, for, in asserting a philosophy, the Church Fathers cannot speak dogmatically. Dogmatic assertions are accompanied by some sign indicating that they are spoken within the apostolic chain of authority, and

⁷⁹Quaestiones celeberrimae in Genesim, op. cit.,
col. 904.

⁸⁰Ibid., col. 916.

that they are, therefore, binding on the faithful. If such a sign is missing, it is an indication that the decree has been issued by men speaking as individual doctors. Such a sign, indicating that the decree was issued either by a Church Council or by the Pope speaking ex cathedra and that it was anathema to hold the Copernican opinion, did not accompany this decree. Therefore, despite Mersenne's assurances that all good Catholics would accept it, we are left with the impression that the decree was not completely binding.

In the middle portion of Quaestiones celeberrimae in Genesim, then, Mersenne tried to reconcile Scriptural interpretation with some of the new developments in science. He was not completely successful, as we have seen, especially in the field of astronomy. He was not as yet convinced that the new theories should be accepted. Yet he was careful to investigate them to discover what advantages or disadvantages they might have. He found that the Copernican hypothesis had run into opposition from the Church. For the moment that sufficed as a reason for rejecting it. Yet he knew the limitations of that opposition. While he followed the lead of the Church in condemning Copernicanism, he did so with much less fervor and conviction than he had used in attacking Italian Naturalism, which he considered potentially much less fruitful. If we now turn our attention to the last third of Quaestiones celeberrimae in Genesim, we find

Mersenne rejecting more vigorously than Copernicanism, and just as vigorously as Italian Naturalism, another possible new science, that of Cabalism.

CHAPTER IV

RENAISSANCE MAGIC AND DEISM

Italian Naturalism was not the only scientific explanation developed during the 16th century. Another possibility was considered by some to offer as satisfactory an explanation of the world as naturalism. Unlike the latter, which grew out of Aristotelianism, this view, which may be called Renaissance Magic, was an outgrowth of Neoplatonism, Hermeticism and Cabalism. Mersenne fought this view even more vigorously and continuously than Italian Naturalism.

He dealt with it primarily in the third major part of Quaestiones celeberrimae in Genesim, to which he gave a separate title, Observationes et emendationes ad Francisci Georgii Veneti Problemata.¹ This is a commentary on a book of Giorgio's which discusses certain Scriptural problems.

There are at least two reasons for Mersenne's devoting this much attention to Giorgio's book. First, it purports to be a series of discussions about questions

¹Observationes, op. cit.

of biblical interpretation, and since Mersenne is himself discussing biblical questions, it fits in here. The second, and major reason for dealing with the book, is the type of thought it represents. Giorgio had adopted many of the Neoplatonic, Hermetic and Cabalistic opinions which Mersenne rejected.² Thus it represented to Mersenne an attempt to explain both religion and natural phenomena, but as with Italian Naturalism, it brought, in Mersenne's opinion, harm and confusion to both. The book was probably topical because it had been republished in Paris in 1622.³

Mersenne labeled those who followed this line of thought "magi" (magicians), and contrasted them with atheists. The latter gave naturalistic explanations for everything including miracles, and thus left no room for God, whether or not they claimed to believe in him. The former explained miracles by claiming that spirits or demons associated with certain constellations were called down to earth by the use of symbols and by the arts of demons, in order that they could perform certain works, either good or bad.⁴ In dealing with the "atheists" Mersenne had to prove that there were such things as angels

²Giorgio's ideas, Mersenne says, were from the opinions "Platonicorum, Rabinorum, & Magorum". Ibid., col. 39.

³Lenoble, op. cit., p. 104n.

⁴Quaestiones celeberrimae in Genesim, op. cit., col. 570.

and demons, and that they could not be explained away. Now, however, he saw himself obliged to attack those who attempted to make too much use of them. The magi he accused of demon worship.⁵ Giorgio represents this tradition.

Francesco Giorgio was born April 17, 1460 in Venice. He studied at the University of Padua, where Pomponazzi had developed Italian Naturalism. Giorgio's interests, however, had taken a different turn. After becoming a member of the Franciscan Minorites, he took up the study of Hebrew and Cabalism, and developed an interest in the "Ars combinatoria" of Ramon Lull.⁶

Giorgio's writings are filled with ideas taken from Hermeticism and Cabalism, but since, unlike Mersenne, he did not give references to the works from which he took his ideas, it has been difficult to trace their source.⁷ However, by comparing some of his statements in the De harmonia mundi, with passages from the Pimander, a basic source book for Hermetic ideas in the Renaissance,

⁵Ibid.

⁶Cesare Vasoli, "Francesco Giorgio Veneto", Testi umanistici su L'Ermetismo, Archivio di Filosofia. Organo dell'Istituto di Studi Filosofici. I (Roma: Fratelli Bocca, 1955), p. 81.

⁷Walker, Spiritual and Demonic Magic, op. cit., p. 112, says, "There is not, as far as I know, any direct evidence of Giorgi's having derived his philosophy from the Florentines."

translated by the Florentine, Marsilio Ficino, it has been shown that Giorgio copied large portions from this book.⁸

He is also linked very tenuously with another leading Renaissance magician, Cornelius Agrippa. A friend of Agrippa's wrote to him of a conversation he had had with Giorgio on topics that interested Agrippa and his friend, and that Giorgio had promised to show him some Hebrew books.⁹

Mersenne himself had no need of specific citations to enable him to recognize the ideas that Giorgio was using. The book had been placed on the Index because of its theological errors.¹⁰ Mersenne went through Giorgio's book, problem by problem, explaining some of the reasons for the condemnations.

One of the major impulses of the Renaissance was the desire to return to, and rediscover the work of the ancients. In the 15th century a group of writers known as the prisca theologia, were revived from antiquity.¹¹

⁸Vasoli, op. cit., pp. 89-90. Vasoli's comparison of these texts gives the evidence Walker sought.

⁹Giovanni degli Agostini, Notizie istorico-critiche intorno: La Vita, e le opere degli scrittori viniziani, Vol. II (Venezia: Presso Simone Occhi, 1754), p. 345.

¹⁰Giovanni Maria Guanzelli, Indicis librorum expurgandorum in studiosorum gratiam confecti tomus primus, per Fr. Jo. Mariam Brasichellen in unum corpus redactus, et publicae commoditati aeditus (Romae: ex typ. cam. Apost., 1607), pp. 446-509.

¹¹Walker, "The Prisca Theologia in France", Journal of the Warburg and Courtauld Institute, XVII (1954), 208.

These were Gentile writers of supposedly pre-Christian antiquity, whose writings contained foreshadowings of the Christian revelation. During the Renaissance, this was interpreted generally in either of two ways. It was assumed that either the knowledge had filtered into other channels from Jewish revelation or that there was an independent pre-Christian revelation outside of the Jewish tradition.¹² In fact, however, the works concerned were written in the 2nd to 3rd centuries A.D., which explains both their traces of Christian theology and their Neoplatonic thought.¹³ The Renaissance emphasis on the works of these writers begins with the translation in 1463 by Marsilio Ficino of the Corpus Hermeticum, attributed to one of the greatest of the prisca theologia, Hermes Trismegistus. So significant was this work thought to be, when it was rediscovered in Italy, that Ficino was asked to put aside his translations of Plato's dialogues, in order to translate it first.¹⁴

A genealogy of the prisca theologia was soon developed which helped to tie together Hebrew and Greek thought. Hermes was said to have lived at the time of, or shortly after, Moses, whose thought he studied. Hermes was succeeded by Orpheus, Orpheus by Aglaophemus, the latter by Pythagoras, whose disciple was Philolaus, the teacher of

¹²Ibid., p. 210.

¹³Yates, op. cit., p. 2.

¹⁴Ibid., p. 13.

Plato.¹⁵

To this Hermetic tradition was added, toward the end of the 15th century, the Cabala, a Jewish mystical tradition supposed to have been handed down from Adam. Moses covertly set down the principles of this secret doctrine in the first four books of the Pentateuch.¹⁶ It was passed along by oral tradition until it was written down by Simon ben Jochai.¹⁷ Although it was also supposed to be contained in Scripture, it was intelligible only to those who had been initiated into its mysteries. Both Hermeticism and Cabalism blended with various aspects of Neoplatonism, to form a body of thought with definite religious implications and associations, which also contained elements aimed at explaining and giving control over the natural world.

It was a combination of these points of view which constituted Renaissance magic, and which Merseune attacked in the Observationes and in other writings throughout his life. One of his major criticisms was of the supposed authorities on which the various parts of Renaissance Magic were based. One justification for relying on Plato and

¹⁵Ibid., p. 14.

¹⁶Christian D. Ginzburg, The Essenes, Their History and Doctrines. The Kabbalah, Its Doctrines, Development and Literature (New York: The Macmillan Company, 1956), p. 84.

¹⁷Ibid., p. 85. Merseune refers to Simon Ben Jochai, Observationes, op. cit., col. 112.

Pythagoras in theology was the claim that they took many of their ideas from Mosaic writings.¹⁸ If this were so, said Mersenne disparagingly, and Plato had been taught from the Mosaic tradition, then he had either remembered it badly or had not learned it well.¹⁹

The attempts of the Hermeticist-Cabalists to blend together several traditions resulted in many conflicting claims, which Mersenne did not fail to point out. Adam was said to have had great knowledge because it was he who had named things. Since this statement was in Genesis, it was not contestable to Mersenne. A point that he did contest, however, was the assumption that the names Adam had given to things shared somehow the power of the thing named, so that by manipulating the letters in the name, one could make use of this power.²⁰

One of the claims made in support of Adam's special knowledge was that he had been taught by an angel whose name was given as Raziele. Angels were supposed to be associated with the seven heavenly bodies, and the names of all seven were given by several authors.²¹ But, said Mersenne,

¹⁸ Mersenne cites Pico della Mirandola's Heptaplus for this idea. Observationes, op. cit., col. 4.

¹⁹ Ibid., col. 44.

²⁰ Quaestiones celeberrimae in Genesim, op. cit., cols. 1383-1400.

²¹ Mersenne mentions Cornelius Agrippa, Trithemius and Robert Fludd. Observationes, op. cit., col. 42.

the names of angels can be known only by divine revelation, and by this means we know the names of only three, mentioned in Scripture. The other names are therefore false, and Adam could not have been taught by an angel whose name was Raziele. Consequently the names Adam used could not have had special powers.²²

Moreover, stories telling who invented magic conflicted. If, for example, it had been invented by one of Noah's sons, how could it have been known to Adam or to one of his sons? Still others attributed the origin of magic to Zoroaster.²³

One of the books in the Cabalistic tradition was the Sephir Jetsira, which was attributed to Abraham. Mersenne flatly denied this latter claim on the grounds that it contained absurd ideas and many errors. He pointed out, for example, that it could not have been written by Abraham, since it contained references to certain Psalms which were written in the time of David. Furthermore, the book's recent exponent, Postellus, who relied heavily on it, also erred in his discussion of nature and science.²⁴

In refuting some of the ideas about magic, Mersenne refers to a book by Casaubon, a Protestant, published in

²²Ibid., col. 41.

²³Ibid., col. 126.

²⁴Ibid., col. 261.

1614.²⁵ Casaubon's work attacked the authority of those ancient writers on whom Renaissance magic was founded, and can be said to draw a dividing line between the Renaissance and the modern world.²⁶ Casaubon was criticizing a book by a Catholic writer called Baronius who disagreed with the Protestant view of church history. The latter had made much use of the various legends and ideas attributed to secret theologians in support of the claims of the Catholic Church. Casaubon criticized Baronius for his lack of judgment in accepting anything that seemed favorable to his argument, and was especially critical of the prisca theologia, the writings of the ancient Gentile theologians on whose doctrines were based many of the Hermetic ideas. He pointed out that these writings attributed to ancient writers, contained references to events and men in later Greek history, that they used a late Greek vocabulary, rather than a more ancient Greek one, that they made use of many of the ideas of Plato and the Platonists, and that many of the hymns were from old liturgies.²⁷

Mersenne's reference to this book, with his approval of its refutation of the Hermetic tradition, shows not only

²⁵Isaac Casaubon, De rebus sacris et ecclesiasticis exercitationes XVI. Ad Cardinalis Baronii prolegomena in annales (London: 1614). Mersenne, Observationes, op. cit., col. 41.

²⁶Yates, op. cit., p.398.

²⁷Ibid., pp. 402-403.

that he was aware of its existence, but that he accepted many of its arguments. He did not elaborate on the book, however, probably because he did not want to praise too highly a book by a Protestant which attacked the historical foundations of the Roman Catholic Church.

Several years later, Mersenne again praised Casaubon's book. In a letter written in 1630, referring to his dispute with the Englishman Robert Fludd, he says that Fludd would abandon his belief in the pseudo-Trismegistus, if he were to read Casaubon.²⁸

Questioning the historical veracity of those to whom Hermeticism and Cabalism were attributed, was one way of attacking the validity of these doctrines. Another way was to examine and reject some of the basic ideas.

A key idea in Renaissance thought was that the heavens are filled with spirits which flowed down to earth and influenced people and events. The properties of certain stars, for example, influenced those born under them. This could be inferred from the Platonic idea that the soul descended from the heavens into the material body; in doing

²⁸Mersenne à Nicolas De Baugy, Correspondance, op. cit., p. 445. This letter is the introduction to the book of Pierre Gassendi defending him against the attacks of Robert Fludd. See the "Epistola" in Pierre Gassendi, Theologi epistolica exercitatio, in qua principia philosophiae Roberti Fluddi Medici reteguntur; et ad recentes illius Libros, adversus R.P.F. Marinum Mersennum Ordinis Minimorum Sancti de Paula scriptos respondetur. Cum appendice aliquot observationum coelestium (Paris: apud Sebastianum Cramoisy, 1630), p. aij verso - p. e verso.

so it would bring with it the influences of the planet or star from which it originated. This could be interpreted literally to mean that the soul came down to earth by local motion (an Aristotelian physical term implying that the soul actually moved from one place to another, just as a ball falls to the earth from the top of a tower), or it could have a metaphorical interpretation. Either way, Mersenne rejected the idea, for he insisted that the soul was created especially by God, and that the idea was condemned by the Scriptures, by the Church Councils, by the Church Fathers, by the Civil and Canonical Law, and by experience itself. He did not deny that the soul at its origin had qualities which inclined a person to particular virtues, thoughts and affections, but he did deny that these inclinations were caused by the influence of certain planets or stars.²⁹

The above idea was shared by both astrologers and magicians, with one major difference. Astrologers believed that they could only read the stars which determine the fate of an individual or the outcome of an event. The magicians worked on the premise that they could control the influences emanating from the heavens and that they could use them as they saw fit. This latter belief was found in both Hermeticism and Cabalism. The heavens were

²⁹Observationes, op. cit., col. 31.

filled with spirits, or intelligences, or influences, or angels, or demons, which could be invoked.³⁰

One of the Platonists of the Renaissance, Marsilio Ficino, whose writings had considerable influence on Giordano Bruno, believed that these heavenly spirits were responsible for many events in history which seemed marvellous. From his reading in the Hermetic Corpus Ficino developed the idea that man could control these heavenly spirits and employ them for his own use. This could be done in two ways - by the use of music and incantations, and by the use of talismans.³¹ Although this seemed to be an attempt by Ficino to understand and make use of natural powers in the universe, and thus might be called a science, (Ficino and his followers referred to it as natural magic), it soon came under attack as an attempt to employ not angelic spirits, but demons. Mersenne objected to it for that reason and refused to make any distinction between "good" magic and "bad".

Mersenne was very much interested in music and devoted a large section of Quaestiones celeberrimae in Genesim to it.³² While discussing the power and influence that music exerts over men, he raises the question of

³⁰See Yates, op. cit., p. 60.

³¹See Walker, Spiritual and Demonic Magic, op. cit., pp. 3-24, and Yates, op. cit., pp. 62-83.

³²op. cit., cols. 1529-1719.

whether music can draw down heavenly influences to earth and rejects it as demonic.³³ The whole idea is a myth, he insists, and an invention of demons and the impious.³⁴

Mersenne recognizes that music can influence man, but the type of influence he admits is the kind we would today call psychological. What he rejects is the idea that the proper words and music can draw down from the heavens influences which will affect the health or emotional state of the person involved. Experience teaches, and all musicians confirm, says Mersenne, that the same words sung with the same harmony have the same effect under various stars.³⁵

Mersenne follows his comments on Ficino with a short discussion of Pico della Mirandola's ideas about music. According to Frances Yates, it was Pico "who first united the Hermetic and Cabalistic types of magic."³⁶ Pico's ideas were based on the ten Sephiroth or emanations from God, which were a significant feature of Cabalistic thought. In this section they are listed and equated with the ten names or properties or powers of God with certain musical harmonies. According to the Cabalists, Moses used

³³He refers here to Ficino's De vita coelitus comparanda. Ibid., col. 1701.

³⁴Quaestiones celeberrimae in Genesim, op. cit., col. 1702.

³⁵Ibid., col. 1704.

³⁶Yates, op. cit., p. 86.

the power of these Sephiroth to overcome the Pharaoh's magicians, and David used them in singing to soothe the feelings of Saul and drive away evil spirits. Mersenne gives a table showing the relationship of the Sephiroth to the properties of God and then dubs the entire system an empty fabrication and groundless. The stars cannot exercise power through sounds. As for the numerical relationships by which the harmony is explained, these are derived a posteriori from the music, rather than vice versa. In Mersenne's opinion the effects attributed to the Sephiroth are merely the effects music has on the individual.³⁷

A second way of drawing down influences from the heavenly spheres, according to both Ficino and Pico, was through the use of talismans, engraved with the proper signs.³⁸ Mersenne discusses this question in a section dealing with the properties of metals and stones.³⁹

The seven planets were said to have seven metals related to them, each with a sympathetic power of attracting the influence of the relevant planet. Because of this sympathetic power metals were said to possess curative powers for particular illnesses. Mersenne recognized that metals

³⁷Quaestiones celeberrimae in Genesim, op. cit., cols. 1705-1707.

³⁸Ibid., col. 1704.

³⁹Ibid., cols. 1145-1170.

do have some kind of medicinal value, but he insisted that this was not because of any relationship to the planets. Experience and reason, he said, show that there is no relationship between metals and planets, because there is no relationship between the properties of the metals and the properties of the planets. For example, Saturn is the planet furthest from us and the slowest moving, but lead, which is the metal supposedly related to Saturn, is not the heaviest metal. Likewise the colors of the metals are not related to the planets, as the color of iron does not fit with Mars, nor tin with Jupiter.⁴⁰

Among the marvellous properties ascribed to metals in stories told by the Hebrews, Chaldeans, Egyptians, Arabians and Greeks, from which the Hermetic and Cabalistic theories were derived, was that of bringing the dead back to life. Mersenne rejected these stories out of hand and simply refused to discuss them.⁴¹ Besides, he had dealt with this problem already in the section on Vanini.

Many of the arguments that were applied to metals could also be applied to stones to show that they had no intrinsic properties which would enable man to draw down the influences of the planets. Another possibility, however, deserved consideration - did metals and stones have any additional power as talismans? Some authorities,

⁴⁰Ibid., cols. 1147-1148.

⁴¹Ibid., col. 1148.

including Ficino and Pico, insisted that certain images, if engraved on the right kind of stone or metal, could draw down influences from the planets.⁴² These influences could protect against certain illnesses or even cure them.⁴³ For kidney diseases, for example, the remedy was the image of a lion carved on gold. Mersenne had already insisted that gold itself had no such power. He now insists that images as such have no power. Nor does he accept the suggestion that it is the density or rarity of the metal in those places where the image is carved which enables it to draw influences from the heavens. Reason and experience, he says again, prove that all these ideas are false.⁴⁴ If, for example, images on metals or stones could make spirits obey man and give him anything he wanted, or reveal any treasure, no one could resist such a man, and kings and princes would certainly use them.⁴⁵

All of these beliefs, Mersenne says, were taught to men by demons who would conspire with men to lead them away from God.⁴⁶ The Hermetic-Cabalistic school maintained on the contrary that these heavenly influences and spirits were not demons but guardian angels, whose intervention in

⁴²Ibid., cols. 1151, 1164.

⁴³Ibid., col. 1165.

⁴⁴Ibid., col. 1149.

⁴⁵Ibid., col. 1166.

⁴⁶Ibid., cols. 1151, 1165.

the affairs of men was procured by the use of the aforementioned incantations, music and talismans. The Cabalists believed that in antiquity these spirits were drawn down by means of idols and statues. By the proper rites, they could be appealed to for certain results. What some people therefore thought of as idol worship, was really an attempt to harness the power of the spirits. The statues were in a way giant talismans. Mersenne would have nothing to do with this rationalization of ancient idolatry. He rejects the entire theory as demonology.⁴⁷

There are, he says, four separate sources for some of these ideas. The first, attributed to Democritus and Orpheus, is the theory that everything is filled with God. God himself is the soul of everything, so that the virtue of a stone is the divine virtue diffused through stones. Mersenne objects to this, on the grounds that the virtues of things are finite and created, while God is infinite and uncreated.⁴⁸ Implied in this theory are the ideas that there is a universal mind that acts in everything, and that God is responsible for evil, since he is the first cause of everything. This latter idea he had refuted in the Vanini section, and both ideas he will refute later in the Impiété des déistes.

The second source given by Mersenne comes from

⁴⁷ Ibid., col. 1165.

⁴⁸ Ibid., col. 1163.

the book attributed to Solomon, which lists the various virtues and powers of stones, along with the incantations, keys, rings and other means of controlling them. This book, says Mersenne, had been proscribed by the Church because it contains so many fables and lies.⁴⁹

Thirdly, he mentions the Pythagoreans who attribute virtues in all things to souls, which can flow out from the stones into men and infuse them with certain virtues and powers. This idea violates the accepted division of things into animate and inanimate, spiritual and corporeal, by giving souls to everything.⁵⁰

Lastly, he mentions Platonic Ideas. Everything is said to have its Idea from which it receives its power and energy. The power and energy of a stone, for example, is derived from its Idea, or, in the opinion of the Hermetists, from the influence of the stars. In both of these cases, then, the virtue of a stone comes from a source extrinsic to it. For Mersenne, on the other hand, the virtue of a stone proceeds from its own form and not from anything outside of it.⁵¹

Giorgio refers to many of the above ideas in his book. Since Mersenne had already analysed them in detail in the earlier parts of Quaestiones celeberrimae in Genesim, he does not go into them in detail again, but rejects them

⁴⁹Ibid., col. 1164.

⁵⁰Ibid.

⁵¹Ibid.

on the basis of his major objection to all of these attempts at magic. He insists that they were attempts to use demonic powers. Most writers who advanced theories of natural magic made a distinction between good magic, which, of course, they insisted theirs was, and bad or diabolical magic which they rejected. Mersenne refuses to accept this distinction and condemns all magic as bad. Moreover, Cabalism gave too much of a religious character to its ideas and rituals. The incantations were too much like the hymns and liturgy of the Church.⁵²

Mersenne vigorously condemns the idea that influences flow from the stars, "like a brook" to the individual below.⁵³ He repeats the charge that this was taught by demons to lead man astray, and that the idea of guardian spirits or familiars associated with the disposition of heavenly bodies, was demonology.⁵⁴ Giorgio's attempt to call these spirits angels, and to suggest that Moses performed his miracles by making use of them, is unacceptable to Mersenne.⁵⁵ If any miracles were performed, Mersenne insists, they were performed by God, using angels perhaps as his ministers, but certainly not by man controlling heavenly spirits.⁵⁶ Furthermore, Hermetic-Cabalistic

⁵²Observationes, op. cit., col. 6.

⁵³Ibid., col. 30.

⁵⁴Ibid., cols. 39-40.

⁵⁵Ibid., col. 260.

⁵⁶Ibid., col. 176.

ideas could not have been taught to man by the angels, for angels would not teach things harmful to man's salvation. Demons were responsible. They sought to make pacts with men for their damnation by means of visible appearance or internal suggestion.⁵⁷

Another major idea in Giorgio's book with which Mersenne is contending belongs to the whole Hermetic-Cabalistic tradition and is often identified as Pythagorean. This is the idea that the world is arranged according to number. The Hermeticist-Cabalists believed, as did the Pythagoreans, that the nature of the universe is mathematical. However, Mersenne does not approve of the way in which they used mathematics. For example, the Pythagoreans believed that certain numbers, specifically the binary numbers, are unclean and impure, and that certain other numbers, such as the triad, are the numbers of justice and purity. This Pythagorean idea is attributed by Mersenne to Apollonius. The notion that some numbers are purer than others, Mersenne insists, is ridiculous and fictitious. Why, he asks, should binary numbers be more unclean than the trinary ones? No doubt the idea originated because people associated the number with the thing numbered, and attributed the goodness or badness of the thing numbered to the number itself. In this way the triad's reputation was derived from the Trinity.

⁵⁷Ibid., col. 31.

But the number two can be used in the same way. It has good associations when used to refer to the Father and the Son, or to the two natures of Christ.⁵⁸ The number twelve was assumed to have an inherent virtue because Jacob had twelve sons.⁵⁹ Too much was attributed by the Pythagoreans and Cabalists, therefore, to numbers, which have no power in themselves.⁶⁰

Another idea in both Pythagoreanism and Cabalism was based on the theory that the letters of the alphabet have numerical values. By substituting their numerical values for the letters in a word, one could arrive at the numerical value of the word itself. Once each word had been reduced to its numerical value, it could be explained by another word of the same quantity. This method was used to reveal the hidden meaning of words, especially those in the Scriptures.⁶¹

Another use to which this method was put led to the development of a science called onomancy. By adding the numerical value of each letter, the life expectancy of an individual could be determined from his name. Mersenne gives two major objections to this idea.

The first objection he makes to all theories based on the numerical value of letters; namely, the values of

⁵⁸ Ibid., col. 108.

⁵⁹ Ibid., col. 247.

⁶⁰ Ibid., col. 108.

⁶¹ Ibid., col. 374.

the letters were the inventions of men, chosen arbitrarily and without reason. He demonstrates this by giving three separate numerical evaluations for the alphabet, one from Cattani, a second from Agrippa, and a third from an unnamed onomancist. There seemed to be no way of deciding that one had any better foundation than either of the other two.⁶²

The second objection to this kind of thought is based on the application of one of these alphabets to show that the numerical evaluations do not give the results claimed for them. To illustrate this, Mersenne takes two names in Latin and applies the theory to them.

M	A	R	I	A	S	T	E	P	H	A	N	U	S
23	3	13	29	3	9	8	22	13	6	3	12	2	9

The sum of the first name, Maria, is 71. If we take the highest possible multiple of 9 away from that number, we must remove 7 x 9 which is 63. This would leave a remainder of 8. Therefore the value of the name Maria is 8. Mersenne does not attempt to explain this rule about the multiples of 9. He merely states that this is a rule of onomancy.

Turning to the name Stephanus, we find that the numerical sum of the letters is 84. Subtracting the nearest multiple of 9 from it, we get a remainder of 3.

According to the theory of onomancy, Maria should live longer than Stephanus, because the numerical value of

⁶²Ibid., col. 1391.

her name is greater than the numerical value of the name Stephanus.

If, however, we examine the same names in French, i.e. Marie and Estienne, and compute their numerical values in the same manner as before, we find that the value of Marie is 9 and of Estienne is 1. According to the rules of onomancy, 1 is a greater number than 9. Thus Estienne should have a longer life than Marie. Here then is a contradiction depending on whether the names are given in Latin or in French. If they are given in Latin Maria should live longer, if in French, Estienne. Onomancy cannot explain away such inconsistencies. Everyday experience disproves it.⁶³

Most ideas in the Hermetic-Cabalistic tradition were expressed in very obscure and mysterious language which only the fully trained person, the magician or magos, could understand. There were various reasons commonly given for this obscurity. It was supposed to make these ideas inaccessible to the ordinary man, so that only those capable of appreciating them could understand them. Also, the symbolism involved was said to be an aid to memory, difficult concepts being expressed in easy to remember stories. Merseune suggests, however, that the ideas were written in obscure language to keep them from being

⁶³Ibid., cols. 1391-94.

completely understood, and criticized by those capable of recognizing the weaknesses in them. He maintains that the symbolism which made use of the names of gods and goddesses, or of words and ideas from Scripture, was used to give the impression that the authors were dealing with august mysteries, revealed by divinities.⁶⁴

Some of the Hermetic-Cabalistic ideas were said to be found in Scripture. Giorgio frequently interpreted Scripture by analyzing it in terms of these ideas found in the Hermetic-Cabalistic tradition. Mersenne insists that in so doing, Giorgio was making too much use of allegory, and departing too far from the literal truth.⁶⁵ He had already discussed the four methods of interpreting the Scriptures, literal, metaphorical, allegorical and anagogical, so he was well aware that interpretations other than literal ones were used by exegetes.⁶⁶ But, he says, the criterion by which to judge the validity of these interpretations is whether or not they fit with the literal sense and the truths of the Catholic faith.⁶⁷ Allegory, for example, is one way in which to understand Scripture, but not Cabalistic allegory.⁶⁸ This may well be one of the

⁶⁴Ibid., cols. 3-6. ⁶⁵Ibid., col. 45.

⁶⁶Quaestiones celeberrimae in Genesim, op. cit., cols. 693-95.

⁶⁷Observationes, op. cit., col. 52.

⁶⁸Ibid., col. 219.

primary reasons for the stress on literalism that begins to develop in this period.

Although Luther and Calvin were not tied to a literalistic view of the Bible, a literalistic emphasis had developed, especially among the Protestants by the beginning of the 17th century. Dillenberger suggests that this developed "under the intense battle with Roman Catholicism over the authority of the Bible."⁶⁹ Another reason may well have been a reaction to Renaissance magic with its extravagant allegorical interpretations. It was not, however, until the latter half of the 17th century that the Renaissance magical view collapsed.⁷⁰

In the year following the appearance of Quaestiones celeberrimae in Genesim, Mersenne published another large work, this time in French, in which he dealt with the same kinds of topics as those which filled the 1623 volume.⁷¹ Like its predecessor, L'Impiété des déistes is a commentary, although this time not on Scripture, but on a long deistic poem entitled "L'Antibigot", referred to on occasion as the

⁶⁹John Dillenberger, op. cit., pp., 37, 96.

⁷⁰Allen G. Debus, Review of Giordano Bruno and the Hermetic Tradition, by Frances Yates, Isis, LV (Fall, 1964), 391.

⁷¹L'Impiété des déistes, athées, et libertins de ce temps, combattue, & renversée de point par raisons tirées de la philosophie, & de la théologie (2 vols.; Paris: Chez Pierre Bilaine, 1624).

"Quatrains du Deïste". A large portion of the book is simply an analysis of the poem, quatrain by quatrain. Because he did not want to give the poem more publicity than it already enjoyed by reproducing it in its entirety, he summarized the ideas in many of the quatrains, giving his summaries afterwards to friends for examination to ensure that he had faithfully reproduced the ideas involved. The author's name was unknown to Mersenne, and is still unknown today.⁷²

The following are some of the questions raised by the poem and answered by Mersenne; are Christians superstitious? does God punish justly? is He responsible for sin?⁷³ Since these questions are not directly related to natural phenomena, we shall leave them aside and turn to those topics which are more in line with our discussion in this chapter.

Several questions concerning Hermeticism-Cabalism are discussed by Mersenne throughout the book. In chapter VII, for example, he deals with the question of the divisions of the Cabala, and whether or not it is a true science. If, says Mersenne, the Cabala were all that the rabbis

⁷² Antoine Adam has published the full poem in Les Libertins au XVII^e siècle (Paris: Buchet/Chastel, 1964), pp. 88-109.

⁷³ L'Impiété des déistes, op. cit., I, 253-819.

claimed, it would certainly surpass all other sciences, for they claim to know, on the one hand, all that belongs to nature, and, on the other, all that concerns the divinity.⁷⁴

Mersenne begins his list of the major divisions of the Cabala with the ten Sephirots or numerations by which Cabalists insisted that the divine Wisdom was made known to them. Besides these, there were 32 paths by which to pass, in order to know all that pertains to nature and to the divinity.⁷⁵ Of these, Cabalists considered the ten Sephirots the most important, for they believed that Adam found the science of all nature in them, that Moses performed his miracles by them, that Solomon acquired his wisdom from them, and that even the Messiah performed his miracles by means of them.⁷⁶

Mersenne also discusses in this book the various methods used by the Cabalists to develop their ideas. One of these, the Gematria, he had already discussed in Quaestiones celeberrimae in Genesim, and refers his reader to the relevant section in this work. By this method letters in the Hebrew alphabet have numerical values, which are added together to give the numerical value of the word they form. Words with the same numerical value have the

⁷⁴Ibid., p. 144.

⁷⁵Ibid.

⁷⁶Ibid., p. 150.

same meaning, and can be used to explain each other.⁷⁷

Another method used by the Cabalists in their "philosophizing" is the Themurah. In this method the letters of a word are transposed to form other words which are then used to explain the first word. For example, the word "God" in Hebrew is el. When the Hebrew letters are transposed, the word becomes lo, meaning "not". This means that we are to understand the divine grandeur in a negative rather than in a positive way.⁷⁸

A third technique is the Notaricon, a type of acrostic. In this method, the initial or final letters of the words in a phrase are grouped together to form a word which is then used to elucidate the meaning of the phrase. Another variation of this method is to use each letter of a word as the beginning letter of another word. Thus from one word a phrase is developed and is used to explain the word.⁷⁹

These methods or techniques of Scriptural exegesis were used by the Cabalists to develop knowledge about religion and nature. Mersenne insists, however, that in both cases the theories and explanations worked out by these methods were merely the inventions of men, and were derived "a posteriori par les effects, soit par science soit par

⁷⁷Ibid., p. 167.

⁷⁸Ibid., p. 165.

⁷⁹Ibid., p. 166.

revelation."⁸⁰

Finally, let us consider another topic which Mersenne discusses in L'Impiété des déistes and which he associates with both Platonism and Cabalism.⁸¹ This is the idea of a world soul which he found in Giordano Bruno's De la causa, principio et uno, and which is one of the main reasons for his criticism of Bruno.

According to Bruno, the world soul is the efficient cause of things, as well as their formal principle, controlling matter entirely. It is the interior form of things that never perishes, while the exterior forms change because they are simply accidents.⁸²

Before such a theory could be accepted, says Mersenne, it must meet one of three criteria: It must give us greater clarity and facility in Philosophy and the other sciences, it must provide the only possible explanation, or it must be the best and most praiseworthy of all possible explanations. However, it meets none of these.⁸³

Mersenne lists several sources for this idea. Various ancient Philosophers heard that the Children of Israel were favored by a God whose power, essence and presence were everywhere. Since they did not have the full Hebrew Revelation, they introduced, instead of God, the

⁸⁰Ibid., p. 163.

⁸¹Ibid., I:127, II:320.

⁸²Ibid., II:361.

⁸³Ibid., p. 370.

more garbled idea of the universal soul.⁸⁴

The Gabalists, according to Pico della Mirandola, spoke of a "ligne verte" which was interpreted to mean world soul. Other Cabalists identified the world soul as one of the ten Sephirots or with other Cabalistic expressions.⁸⁵

Orpheus, one of the prisci theologii, is among those who used the idea of a world soul to explain the partly understood Hebrew idea of God. If the rocks and the forests followed the sweet music of his voice and his harp, he might have had some reason for believing in a universal soul. But, says Mersenne, these stories are only fables or figurative expressions.⁸⁶

Mersenne rejects all such attempts to speak of a world soul or universal soul, if taken in their literal meaning. He recognizes in them, however, attempts to speak of God who theologians say is everywhere, and who comprehends everything. Those Philosophers were simply trying to comprehend God with their understanding; they did not have the light of faith by which a child penetrates further in the knowledge of the true God.⁸⁷

Having discussed the origin of the idea of a world soul, Mersenne then considers why a Catholic could not

⁸⁴Ibid., p. 411.

⁸⁵Ibid., p. 412.

⁸⁶Ibid., p. 413.

⁸⁷Ibid., p. 418.

subscribe to such an idea. He gives three reasons taken from natural philosophy for rejecting it.

Firstly, it does not give us any clarity or facility in Philosophy. For example, to say that amber and crystal attract straw because of the world soul is no more satisfactory an answer than to say that this virtue results from the particular property of the specific form of amber: for the problem is to know the basic distinctions between a piece of amber and a piece of wood which have similar external appearance. We can see only the quantity, the figure, the light or the color of a thing, but not the interior accidents, and yet the externals that we see are no less hidden to our mind than the internals. What then is the value of this universal soul? It is no better known by us than the accidents. To give it as an explanation is to speak without foundation, without experience, and without reason.⁸⁸

Secondly, the efficient cause of the universe could not possibly be the world soul because it could not create anything. It takes an infinite power to create something from nothing.⁸⁹

Thirdly, if everyone and everything is part of the universal soul why do we not know the feelings of a mite or of some other animal? The answer is that it does not

⁸⁸Ibid., pp. 372-74.

⁸⁹Ibid., p. 381.

have the same soul as we have.⁹⁰

Mersenne also gives certain ethical objections to the theory of a universal soul. If the world soul were the efficient cause of all our actions, we would have no freedom, and if man has no freedom, then he cannot be blamed for his actions.⁹¹ If there were a universal soul, then he says, I would participate in your actions and you in mine. Thus if I killed you, you would be just as responsible as I, for you would be acting in and through me.⁹² If this theory were correct, it would be only the external form that perishes when a man dies. Thus it would be no sin to kill a man. Killing a man would be no worse than killing an ant or a gnat.⁹³

Finally, Mersenne finds some theological objections. If there were only this universal form in all bodies there could have been no such thing as the birth, death and resurrection of Christ, since this universal form never separates itself from any particular body.⁹⁴ Furthermore, the doctrine of transsubstantiation of the bread to the body of Christ would be invalid, since both would have the same form and the same substance already. And lastly, what would happen to the Grace communicated in the Mass? Would

⁹⁰Ibid., p. 392.

⁹¹Ibid., p. 397.

⁹²Ibid., p. 398.

⁹³Ibid., p. 399.

⁹⁴Ibid., pp. 404-405.

it be received in the universal soul, or in the accidents of the body? If it were received in the soul, what purpose would it serve? Would it help to save the universal soul from Hell?⁹⁵

All these Hermeticist-Cabalist ideas, including that of the World Soul, which were put forward by those in the NeoPlatonic tradition, offered, in Mersenne's day, a semi-coherent explanation of both science and religion, which combined history, authoritative writings, revelation and mathematics to enable man not only to explain but also to control his world. The control was to be exercised over spirits and influences which were supposed to inhabit the universe, especially the heavens. God was not the direct creator of the universe, but only of certain other powers, such as these spirits and influences, or the World Soul, which then became the efficient cause, or the producing cause, or earthly things.

Mersenne refused to accept this composite picture. He attacked it at all points, rejecting the historical claims, the authenticity of the authority figures, denying that they really had revelation, refusing to believe that the mathematical symbols had any relation to the phenomena to which they were applied, and that their use was anything but arbitrary. His basic objection to the whole view,

⁹⁵Ibid., p. 406.

however, was that parts of it had been condemned by the church as demonology. Here again, then, we find Mersenne attacking a scientific view which was being put forward as an alternative to a collapsing Aristotelianism.

CHAPTER V

ALCHEMY, SCEPTICISM AND ARISTOTELIANISM

In 1625 Mersenne published a work which more directly expressed his interest in science and his awareness that it was undergoing reevaluation in this period. The book, La Vérité des sciences, was written as a dialogue expressing three different scientific points of view.¹ Two of these represent possible alternatives to the heavily attacked Aristotelianism, while the third is Mersenne's defense of the beleaguered Aristotelian position. The first alternative rejected by Mersenne was Alchemy, a very real possibility in his day.

Alchemy existed on two levels. In the popular mind it dealt with devils, demons and magic operations.² There were some charlatans who, after having burned, calcined and reduced to cinders all that they possessed, became so poor and needy, that they had either to beg their bread or find someone to dupe by persuading him that he

¹La Vérité des sciences, contre les septiques (sic) ou pyrrhoniens (Paris: Toussaint du Bray, 1625).

²Ibid., p. 91.

would see marvels.³ They put notices on streetcorners in Paris stating not only that they could cure all sorts of ill, but that they could teach how to make the powder of projection with which to turn base metal into gold.⁴ On the more profound level, Alchemy was in fact the empirical science of the 16th century. The Alchemists claimed that it was based on observation, and especially on experiments performed in the laboratory. Although they were attempting to establish a new philosophy, they claimed to be reviving a more ancient knowledge than the Aristotelian in order to give the ideas greater acceptability or authority.⁵

In order to discredit Aristotle's ideas, they attacked his personal life, contending that he dissipated by debauched and lewd living the fortune his father left him. It seems that every opportunity for criticism was seized by those who wished to discredit Aristotelianism.⁶ The Christian Philosopher, who, we assume, is speaking for Mersenne, answers that we do not know that this is true about Aristotle, and, besides, even if we suppose that Aristotle lived a very depraved life, his ideas would be none the less valid.⁷

The real objection to Aristotle made by the

³Ibid., pp. 3, 105.

⁴Ibid., p. 101.

⁵Ibid., pp. 1-3.

⁶Ibid., p. 86.

⁷Ibid., p. 108.

alchemists is that although Aristotle conducted some experiments he did not rely enough on them. The Alchemist, therefore, freely abandons Aristotelian opinions when they are contrary to the results of his experiments.⁸

This complaint against Aristotle is one which we are accustomed to associate with the developers of modern science, and yet it is made here by those whose scientific approach Mersenne rejects as invalid.

The Alchemist in the dialogue freely confesses that there are many ignorant men who claim to be alchemists. Before they can properly be called alchemists, however, they must first know the true materials of the alchemist's art, and how to make them.⁹

The third person of the dialogue is a Sceptic, who maintains that since everyone sees things differently, we can have no knowledge. The Alchemists's answer to this objection is that empirical observation disproves this. We can know the weight of things, such as a cubic foot of earth. By using this knowledge we can compute other things, such as the weight of the whole earth. A science based on this kind of information would surely meet the sceptic's objections. "Ceste science des poids n'est point empeschée par les images des objects, et le flus et reflux de tout."¹⁰

⁸Ibid., p. 167.

⁹Ibid., pp. 6-7.

¹⁰Ibid., pp. 45-47.

In part, the Alchemist agrees with the Sceptic, in that he, too, rejects other theories of knowledge, as we have seen from his comments on Aristotle; he is interested primarily, however, in what can be seen and measured. For the Alchemist, those who do not work in the laboratory consider only the surface of things and their accidents.¹¹ Merenne himself was aware of the value of experiment and observation in the laboratory. He also realized, however, that experiments and observations are not the whole of science. The part of Alchemy that Merenne rejected was the theory used to explain the laboratory results.

The alchemists had a variety of basic principles on which their theories were based and took issue with the basic principles of others. Merenne discusses first their negative principles, then their positive ones. There is no one single principle from which all others are developed, nor are their basic principles infinite; they are neither chaos, nor atoms, nor the sensible elements, nor the mathematical figures and numbers. On the contrary, their principles are finite; they are not produced from other principles, nor from each other; they produce all things, are opposites, such as form and its privation, and are three in number.¹²

The three basic principles referred to here are

¹¹Ibid., p. 96.

¹²Ibid., pp. 88-89.

salt, sulfur, and mercury.¹³ Since modern chemistry with its theoretical atomic base did not develop until more than two hundred years later, we can understand why the alchemists adopted their own "principles", which are somewhat the equivalent of our "elements."

Along with these basic principles, which the alchemists used to explain their work, went other theories which provided the motivation for much of the work in the laboratories. A key idea was that of the great Elixir or the Philosopher's Stone. To know how to make this was the mark of a true alchemist.¹⁴ This Stone, which Mersenne does not discuss in detail here, was a key factor in attempts to transmute common metals into gold.

The alchemists believed also in a universal spirit, which, among other things, makes the plants grow. An example of this is the way in which the acorn grows up into a tall oak, but does not diminish the earth in which it is rooted. It is this universal spirit which likewise nourishes man. According to the alchemists, a man's stomach passes the same amount of excrement as the amount of food eaten. The nourishment, therefore, must come from the spirit enclosed in the food.¹⁵

Mersenne was singularly unimpressed by the theories

¹³Ibid., p. 56.

¹⁴Ibid., pp. 6-7.

¹⁵Ibid., p. 99.

of the alchemists. His major criticism of them was that their experiments and observations in the laboratory did not prove their theories. The Christian Philosopher, speaking undoubtedly for Mersenne, rejects the sulfur, mercury and salt of the alchemists on the ground that they are not first principles, since they can be dissolved into earth and water by fire. They are, therefore, only second or third principles.¹⁶ It would be better, he says, to abandon such theories, for the only transmutation the alchemists produce in the laboratory is to turn substances into useless carbon and ashes. It would be better to accept the doctrines of Aristotle, for although Aristotle's doctrines are not wholly acceptable, they are much more so than the ideas of the alchemists.¹⁷

One suggestion, which Mersenne puts into the mouth of the Alchemist, he himself advocated. This was the idea that an academy of alchemy and of other arts should be set up in each country, to discover things beneficial to man's health, to prevent abuses of the art, and to punish charlatans.¹⁸ Mersenne had suggested a similar idea in the preface to Quaestiones celeberrimae in Genesim, and was instrumental a few years later in establishing such a group for mathematics.

¹⁶Ibid., p. 56.

¹⁷Ibid., p. 84.

¹⁸Ibid., p. 105.

One of the major reasons for Mersenne's attack on alchemy was that the alchemists wished to pass off the mysteries of the faith as natural things. There were some, for example, who said that no demons exist other than the impurities which choke the humid radical, that bad demons are only bad air, and good demons subtle and vital air. All of this, alleges Mersenne, is heresy.¹⁹

Alchemists ought to be prohibited from using the Scriptures to explain their art, which they do by comparing the universal spirit to Christ, and certain operations performed with mercury to Christ's death and resurrection. We should speak of the Scripture with more restraint, circumspection and respect, for its chief goal is our salvation. Otherwise, some will think that it refers only to things related to the Philosopher's Stone and to alchemical operations. The alchemists did in fact maintain that all the pagan theology, magic and poetry of the ancients signified only alchemical operations.²⁰

A variety of alchemical books had been attributed to certain well-known figures in the past. Two of the most prominent were books attributed to Aristotle and to St. Thomas. Mersenne denied the authenticity of their authorship. As for other alchemical works attributed to Adam, Solomon, Abraham, Moses, Esdras and Hermes, these, he

¹⁹Ibid., p. 116.

²⁰Ibid., pp. 117-18.

insists, were attributed to them merely to give the books credibility and a reputation.²¹

Alchemy represented itself as based on empirical research, but Mersenne looked beyond this claim to empiricism to the theories which the research was supposed to verify.

One of the most outstanding exponents of empiricism in the early 17th century was Francis Bacon, Lord Verulam. Since Bacon, like Mersenne, condemned the alchemists for their premature development of dogmas on the basis of a few experiments, we might suppose that Bacon's writings found favor with Mersenne. This was not the case, however. Because the subject was pertinent to his discussion at this point, Mersenne discusses briefly Bacon's suggestions in his Great Instauration.

Bacon listed four Idols which prevent us from knowing the true nature of things. Mersenne denied that these idols necessarily lead us astray, "car avant que d'etablir un axiome, nous examinons les effets et les causes non seulement entant qu'elles se rapportent a nous, ou qu'elles nous servent, mais entant qu'elles sont parties de tout l'univers."²²

Bacon attacked various aspects of Aristotle's thought on the grounds that Aristotle had not performed many experiments. Mersenne had already dealt with similar objections from the Alchemist, and now gave a like answer

²¹Ibid., p. 172.

²²Ibid., p. 207.

to Bacon. We need not suppose that Aristotle did not make necessary experiments before advancing a certain maxim; or if he did not himself conduct such experiments, then we can suppose that he assumed them, or derived them from his predecessors. For there is no reason to think that so great a man would lightly put forward the ideas to be found in his Physics and in his other books.²³

Bacon objected to Aristotelian terminology. This became a standard item of criticism of Aristotle, and is often repeated in our own time. Mersenne does not give a concrete example, but simply states that it makes little difference how we speak as long as we understand what it is we mean to express. Besides, the innovation of terms, he feels, distracts and hampers progress rather than assists it.²⁴

Mersenne did not accept Bacon's criticism of science. Instead, he turned the latter's criticism back on himself. Bacon insisted that we ought to engage in a great deal of observation and experiment before drawing any conclusions or setting up any theories. Why, Mersenne wants to know, did Bacon not take the trouble to find out what the scientists of the various nations were doing, before proposing a series of rules that either are not needed, or are already being practiced among the learned. Most of the

²³Ibid.

²⁴Ibid., pp. 208, 211.

experiments which Bacon proposes in his Great Instauration, says Mersenne, have already been made.²⁵

Although Mersenne agrees with Bacon that all kinds of experiments should be made, he does not accept Bacon's excessive reliance on them. We should not think, he says, that we can perceive the nature of things by our senses, for they see only the exterior of things. We can atomize and dissolve objects by fire, water or the power of the mind, but we can never arrive at the point where our intellect is capable of penetrating to the nature of things. This, he says, is why Bacon's proposals are impossible, and why his instructions would result only in some new observations and experiments which could easily be explained by ordinary knowledge.²⁶ In other words, Mersenne is insisting that experiments only afford us sense data that can be explained by a variety of theories. He had already pointed out that the alchemists emphasized experiment and observation, and yet the theories they employed to explain their results were completely unacceptable.

Mersenne goes on to explain a little more fully his attitude toward empiricism. Man's mind can conceive of many truths which cannot be perceived by the senses. The senses are the doors which give access to external objects. Conclusions about the objects of experience, however,

²⁵Ibid., p. 211.

²⁶Ibid., pp. 211-12.

come from a secret cabinet of the understanding which has a brighter and better light, by means of which it discovers the errors of the senses whenever these errors occur. He cites as an illustration the fact that a stick in water appears broken, but reason uses the light of optics to make us realize the deception.²⁷

The major problem with which Mersenne struggles in La Vérité des sciences is that of Philosophical Scepticism, which was undergoing a revival in this period. The most outstanding sceptic in the French thought of this time was Michel de Montaigne. Although he lived in the latter half of the 16th century, Montaigne did not exert as much influence on the first third of the 17th century as he did on the last two thirds.²⁸ It is perhaps for this reason that Mersenne devotes little attention to him, mentioning him only in passing.²⁹

The next most famous French sceptic in this period is Pierre Charron, chanoine théologal of Condom. Mersenne deals briefly with Charron in his Impiété des déistes. If we can assume that Mersenne used the same procedure in writing this book that he used in writing the unpublished manuscripts on the remaining books in Genesis and on the

²⁷Ibid., p. 222.

²⁸See Busson, op. cit., p. 178, for a discussion of Montaigne's influence before and after the 1635 edition of his Essais.

²⁹Quaestiones celeberrimae in Genesim, op. cit., col. 910.

Evangiles, we can explain the development of his thought with regard to Charron.³⁰ In these two extant manuscripts, Mersenne set aside certain pages to deal with particular topics. Since he did not finish the manuscripts, we find in several places that the subject heading is followed by several blank pages. These are followed by other topics which he has gone on to discuss. It is quite possible that Mersenne did this in writing about Charron. This would explain why he begins by alleging that Charron's life was not what it should have been, and that he kept company with libertines whose ideas smacked of atheism, and yet later in the discussion accepts as true a description of his exemplary life in an "Eloge", published in the second edition of Charron's Sagesse.³¹ It may well be that Mersenne began his discussion of Charron before he saw this second edition, and that he simply left his original comments unchanged, adding to them his later impressions.

³⁰Mersenne's Quaestiones celeberrimae in Genesim dealt with only the first two chapters of the book of Genesis. He continued to work on a commentary on the remaining chapters in Genesis along with a commentary on the New Testament, neither of which he finished. They may be found in the Bibliothèque Nationale, fonds latin, nos. 17261 & 17262.

³¹Impiété des déistes, op. cit., I:183, 196. Pierre Charron, De la sagesse, livres trois (Bourdeaus: S. Millanges, 1601), De la sagesse, trois livres, auxquels est adjouté un recueil des lieux et chapptres, suivant la première édition de Bourdeix, 1601, plus un petit traicte contenant un sommaire des trois livres, un apollogie et response aux plaintes et objections qu'on faisoit contre iceux, avec quelques discours chrétiens, trouvez après le décez de l'auteur (et publiés par G.M. de la Rochemaillet) (Dernière édition, Rouen: C. Le Villain, 1618).

Mersenne's main criticism of Charron is that his Sagesse contained many things that could lead a person, whose religion was not strong, astray. He believes that those who are well educated in Philosophy and Theology can read the book without harm, but that the untrained person cannot. This is true, he feels, even after the revision made in the second edition.³²

Part of the difficulty with Charron's book arises, in Mersenne's opinion, because he does not distinguish clearly between his own opinions and those of others. For this reason some might believe false or worthless ideas to be his own. This misunderstanding, says Mersenne, arises from the style of writing used by Charron, from imprudence, or from malice. In his original discussion of Charron, therefore, Mersenne will not exonerate him completely, since he knows that his book will make many libertines.³³

However, when Mersenne looked at the second edition of the Sagesse, and saw that Charron had corrected many points, he felt that, while the book was still dangerous, he could at least suppose Charron innocent of any bad intentions.³⁴

In his more charitable mood, Mersenne maintains that the second edition shows that Charron is not a

³²Impiété des déistes, op. cit., I:187, 197.

³³Ibid., pp. 189-91.

³⁴Ibid., p. 201.

Pyrrhonist, since the latter had averred that the freedom to judge or to suspend judgment does not apply to divine or supernatural things.³⁵

Among those statements to which Mersenne objects as being misleading is Charron's contention that all religions furnish miracles and prodigies. If we take this statement literally, says Mersenne, it is false, for only the Catholic religion has true miracles. Rather than draw the wrong conclusion from the Sagesse, however, Mersenne recommends that we look at Charron's Trois Véritéz, in which he discusses religion at length. In this book he defends the Catholic religion as the only true one.³⁶

Mersenne objects also to Charron's statements that the immortality of the soul is the most widely believed and the least proved idea, and that we are born Christians, Turks or Jews, so that our religion is not of our choice.³⁷ Mersenne feels that he has already shown that the immortality of the soul can be proved. He now insists also that man is able to exercise his free will to choose the Catholic religion.³⁸

Thus, while Charron becomes for later generations primarily a second ranking sceptic, lacking the significance of Montaigne whom he is said to have copied, for

³⁵Ibid., p. 202.

³⁶Ibid., p. 203.

³⁷Ibid., p. 205.

³⁸Ibid., p. 208.

Mersenne, Montaigne is barely mentioned, and Charron is only hesitantly identified with Pyrrhonism. In spite of this, however, scepticism did play a significant role in the intellectual movements of the period. For this reason Mersenne devotes a major portion of his work, La Vérité des sciences, to dealing with the problem.

The sceptic Mersenne was dealing with in La Vérité des sciences was much older than either of these. The work of Sextus Empiricus, a Pyrrhonist of the 2nd century A.D., had been rediscovered in the West in the 16th century.³⁹ Mersenne's comments on scepticism here are a commentary and refutation of the first two books of the Outlines of Pyrrhonism of Sextus Empiricus.⁴⁰

In Mersenne's dialogue the Sceptic begins with his basic contention, namely, that no one knows anything certain in this world, for nothing can be known as it is in itself. We see only the surface of things and do not know their substance. We do not know the sea, for example; - the kinds of fish, its source, its properties of movement in the tides. Nor do we know the heavens. There may be stars, or planetary systems other than those we see. The

³⁹Richard H. Popkin, The History of Scepticism from Erasmus to Descartes (Assen, Netherlands: Van Gorcum and Company, 1960), p. xi.

⁴⁰Ibid., p. 135. See also Popkin, "Father Mersenne's War against Pyrrhonism," The Modern Schoolman, XXXIV (January, 1957), 61-78.

Sun appears only a foot wide, and we do not even know if it is moving or standing still. Aristotle is wrong to say that the understanding knows the essence of things. We see only their exterior accidents.⁴¹

We do not really understand anything, he continues, unless we know all its causes. And, since there is an infinite number of causes, we cannot know them all. Therefore we do not really know anything. We do not know, for example, all the causes of the paper on which we write, such as its matter, its form, its maker, its location, the water and manufacturing tools needed to make it, nor its atoms, nor how its parts are held together.⁴²

Since, then, he says, an individual thing cannot be known, Aristotle is wrong in supposing that we can form true and permanent universals from our knowledge of a number of individual things.⁴³

At this point, the Christian Philosopher, who speaks for Mersenne in this dialogue, responds to these objections of the Sceptic. It is true, he says, that we do not know all the causes of anything, nor the last and final difference between the individual thing and its species. We also cannot penetrate to the substance of anything except by its accidents. Nevertheless, we do not

⁴¹La Vérité des sciences, op. cit., pp. 7-9.

⁴²Ibid., pp. 9-10.

⁴³Ibid., p. 10.

need to know all of these things. We do not need to know all of the causes of a piece of paper, for example, unless we wish to know perfectly, as God knows. We do know, however, its effects, its operations and its uses, by which we distinguish it from all other species of things. We can be satisfied with knowing the effects, or the surface and accidents of things, for we can rise from them to some kind of an awareness of God and of other substances. Such a little knowledge suffices us as a guide in our actions.

It is quite true, he continues, that our senses are limited. It is for this very reason, therefore, that our understanding does not rest with the simple apprehension of a sensation, but checks other things before forming a conception. The eye is corrected by the other senses or by reason, until it comes to the certitude needed for true knowledge. It is true, he says, that the Sun appears small to our eye. This defect of the eye, however, is corrected by our reason, for when we see that the Earth's shadow terminates in a pyramid, we conclude that the Sun is larger than the Earth.⁴⁴

The Sceptic again asserts that there is nothing sure in all the sciences. Everyone sees things differently. Some things are sweet to some, sour to others. Even in religion, there is a great variety of beliefs and practices.⁴⁵

⁴⁴Ibid., pp. 14-20.

⁴⁵Ibid., pp. 29, 37.

The Alchemist answers this objection by putting forward the point of view of the empiricist. He suggests that a science based on the weight of things is not impeded by the appearance of things, nor by their continual change.⁴⁶

Mersenne, on the other hand, does not accept the purely empirical answer, as we have already seen in his discussion of alchemy and of Bacon. The Christian Philosopher answers for Mersenne that, where science is concerned, we do not need to wait until all give the same answer to the same questions. For some have no science other than that they know that certain things are useful and fitting, and they do not judge things absolutely.⁴⁷

This is not so of metaphysics and physics which do treat of things absolutely. However, we need not, he says, concern ourselves with their principles, for even the Sceptic must agree that, in the case of metaphysics, there is something in the world and not nothing, and in the case of physics, who can deny that there are bodies and movement, light and quantities, which are dealt with by the senses? At least we all know this much. It makes no difference, therefore, that there are diverse opinions about the principles of nature. There are some things which we know to be true, even though they are mixed with error.⁴⁸

⁴⁶Ibid., p. 46.

⁴⁷Ibid., p. 50.

⁴⁸Ibid., pp. 56-57.

The same can be said of morals, continues the Christian Philosopher. We are sure that we should avoid evil and seek the good. There is no people nor law that does not approve this basic concept, even though there are different laws and different customs in the various parts of the world. Here again, he says, we know at least one basic truth in spite of the diversity.⁴⁹

Mersenne then lists ten fundamental ideas of scepticism and gives a refutation of each. The keynote of most of them is the diversity in all things. There is diversity in taste, for example. Certain things are agreeable to some, and disagreeable to others. Men have different moods and temperaments. Because of the difference in the senses, we do not perceive all the qualities of the things we see. To all of these points Mersenne agrees. Yet, for him, this is not all that can be said. He insists, for example, that things generally seem the same to those with similar organs and similar temperaments. In spite of our different moods we agree on many things: that fire is hot and ice is cold, that iron and steel are hard, and on many other things of the same order. Also, even if there is diversity in our sense perceptions, we know that we must have eyes to perceive color and ears to hear. In all of these instances we find, therefore, that there are some

⁴⁹Ibid., pp. 56-57.

things that we do know.⁵⁰

The Sceptic then raises several objections about our judgment, and whether or not we can exercise it. He points out that things appear differently when we are asleep from when we are awake. That is true, answers the Christian Philosopher, but we judge, when awake, that what we saw, when asleep, was false, but not vice versa.⁵¹

Another objection raised by the Sceptic is that objects appear different because of differences in situation, distance and location. A tower, for example, appears round in the distance, and square from nearby. Mersenne answers that regardless of how a tower appears from a distance, a square tower appears square from close by; this can be demonstrated by applying a ruler to it if necessary. The knowledge that the tower appears square from close by, plus the realization that things have a different appearance from a distance, suffice, he contends, to establish that the true shape of the tower is square.⁵²

The Sceptic further objects that our senses do not apprehend anything in its purity, for things do not appear always the same. The differences are caused by the diverse quantity, composition, division and preparation of objects. For example, silver is white, but silver filings are black,

⁵⁰Ibid., pp. 134-43.

⁵¹Ibid., pp. 143-45.

⁵²Ibid., p. 147.

and goats' horns are black, but the horn filings are white. To these objections the Christian Philosopher makes the same response. We do not trust a single sense, nor even all of the senses taken together, but use reason to judge them; by this means we know many things not revealed directly by the senses. As for the silver and horn filings, at least we know that when assembled into silver and horns, they appear of a different color.⁵³

To those like the sceptics who would oppose custom to custom and law to law, Mersenne answers that we have reason for our guide in morals. It shows us how to live in conformity with nature.⁵⁴

As the dialogue continues, the Sceptic attacks the validity of logical reasoning. A syllogism, he maintains, is no stronger than its premises. And how do we prove the premises except by deducing them from prior premises, and how do we prove these premises, except by deduction from prior ones, and so on in an infinite regress. To get around this problem, he continues, some attempt to prove the universal proposition by deriving it from particular propositions, and then in turn prove the particular proposition from the universal. An example of this circular reasoning is the attempt to prove that man is a rational animal, by showing that Paul, Pierre and others are

⁵³Ibid., pp. 148-50.

⁵⁴Ibid., p. 154.

rational. And then prove that Paul and Pierre are rational because man is a rational animal.⁵⁵

Mersenne disagrees with this attack on the syllogism. Deductive logic is necessary, he says, because the conclusion is not obvious in the premise. Such logical demonstrations serve only to help us understand the ideas contained in the major premise. We avoid the pitfall of circular reasoning, however, for we prove the premises not by deduction, but by induction, or by recognizing that they are self evident. We do not prove that Pierre is rational because man is rational, but we prove it from the knowledge that all men exercise reason. Mersenne thus accepts the necessity for and validity of deductive logic.⁵⁶

Since science deals with the sensible world, Mersenne examines the validity of sense perception. Each sense, he says, judges the objects proper to it: the eye, light, the ear, sound. When our eye perceives the Sun at midday, we are certain that it is day, even though there may be some who, as a result of an illness of the eyes, cannot see it. Mersenne readily admits, as we have seen above in the case of the tower, that the senses can be deceived. But this proves only that, in order to be able to judge its object, each sense must have what is in accord with its nature and with the perfection of its operation.

⁵⁵Ibid., pp. 180-81.

⁵⁶Ibid., p. 196.

If these conditions are fulfilled, he insists, the senses never err.

The impressions registered by the senses are collected in the common sensorium, where the differences among them are noted. They are united into an intelligible whole by the understanding, which judges them, recognizing and correcting the faults and abuses of the senses arising from their indisposition and incapacity.⁵⁷

There are some basic principles, he believes, which serve as guides to the understanding, and on which all men would agree, e.g. the principle that fire is hot. Fire would burn those who doubt this, and thus give evidence of the truth of this principle both to the senses and to the mind. The same is true, he insists, of all other maxims in our demonstrations. There is no one, e.g., who does not admit that the whole is greater than one of its parts.⁵⁸

The senses, he continues, serve only to furnish the understanding with impressions, and cannot judge the conformity of these impressions with the external object. This judgment must be made by the understanding. Truth stands in judgment on the understanding, for if whatever we apprehend and believe to be true, is later shown to be untrue, the understanding abandons the belief and embraces the truth.⁵⁹ This can be seen in the example of the fire.

⁵⁷Ibid., pp. 191-92.

⁵⁸Ibid., p. 192.

⁵⁹Ibid., p. 195.

The senses are not deceived, therefore, when each examines an object appropriate to it, and when the required conditions are present, for the understanding compensates for any lack in the senses by what Mersenne calls a spiritual and universal light which it has of its own nature. This natural light, he says, is perfected and brought into operation by means of meditation, study, experience and science. Empiricism alone is not enough. We do not verify the operations of the understanding by the operations of the senses, but vice versa. For as soon as the senses give some indication of the object to the understanding, the latter examines all of the circumstances and conditions pertaining to the object, and makes no absolute judgment until it has considered all those things which could cause some deception or surprise. For example, when a tower seems round in the distance, the understanding does not judge immediately, but commands the eye to approach closer and apply a ruler, if necessary, in order to see and experiment. After having seen and made the necessary experiment, it then judges the evidence and is not deceived.⁶⁰

The question at issue here is the validity of the inductive process, or indeed, whether the development of any science is possible. Deduction must begin with premises that are true. Can such premises be found? All the way through this discussion Mersenne has been pointing up

⁶⁰Ibid., p. 194.

his belief that we do know at least some things. Although we do not know substances, essences and all causes, at least we know the accidents, effects, and operations of a number of things. If we do not accept absolute metaphysical or physical principles, at least we know that something, and not nothing, exists, and that there are bodies in motion, light and quantities. These things are true, he insists, even if they are intermixed with erroneous ideas. Thus we need not be sceptical about everything. Is this enough to base a science on? Mersenne thinks so. His position is one of scepticism towards certain traditionally accepted ideas, e.g. our ability to know substance. Yet he insists that there are some things we do know, and that these suffice to enable us to build a science. Lenoble calls Mersenne's attitude "positivism".⁶¹ Popkin calls it a "mitigated scepticism."⁶²

It is in part this attitude which motivated him to continue his search for a new science. He could conditionally accept the sceptic's viewpoint, especially with regard to the past. Yet he did not embrace scepticism so completely that he abandoned all attempts to develop a new science.

In fact, in this period he was still clinging to

⁶¹Lenoble, op. cit., p. 334.

⁶²Popkin, The History of Scepticism from Erasmus to Descartes, op. cit., pp. 130-42.

Aristotelian science as the best available. Yet he admitted and perhaps hoped that this might be replaced by something better. Aristotle was not infallible he knew, for he had rejected the attempt of the Italian Naturalists to return to an earlier Aristotelianism before the modifications of St. Thomas had made him acceptable to the Church. Nevertheless, Aristotle was preferable to the Alchemists, he insisted, for he recognized that man's reason must play a role in the development of science, a suggestion rejected by empiricists. Moreover, Aristotle's theories were simpler than those of the Alchemists. Since he believed it possible to outdo Aristotle and find a better science, Mersenne continued his examination of the various sciences of the day, denouncing those that were, in his opinion, worse than Aristotle and those that did not fit as well with the doctrines of the Church.

CHAPTER VI

THE FLUDD-MERSENNE CONTROVERSY

Yet another alternative to a faltering Aristotelianism being offered in the 17th century was an attempt to pick out, and weave together, threads from the Hermeticist, Cabalist and Alchemist traditions, to form an entirely new scientific explanation of the world. As far as Mersenne was concerned, the major exponent of this system was Robert Fludd in England. Fludd, who began to publish in 1617, had already encountered the opposition of Kepler. In 1623 Mersenne added his comments to the dispute, supporting Kepler against Fludd. This brought an attack upon himself, whereupon Mersenne enlisted the help of Gassendi in defending himself against Fludd. The latter was joined by Jacques Gaffarel, both sides trying to expand and support their own position, and to discredit the opposition by pointing out weaknesses. Mersenne was on the path that would eventually lead to modern science. Although traces of Fludd's view still exist today, as is evidenced by the appeal made by Rosicrucian advertisements to tap the mental power of the universe,

it was not successful in establishing itself as the best approach to science.¹

Fludd, who, from his student days at Oxford, had been investigating secret studies on Genesis and Astrology, began publishing a series of books which were based on the secret writings of the prisci theologi, Cabalists, Alchemists and Astrologers.² The first book was a defense of the Rosicrucians, a new society making its appearance about this time.³ The preface to this volume gives us some insight into the foundation of Fludd's thought. It is based, he says, on the ancient wisdom of Moses, which contained the key to both natural and supernatural knowledge, and

¹An interesting discussion of the Fludd-Kepler controversy can be found in W. Pauli, "The Influence of Archetypal Ideas on the Scientific Theories of Kepler," in C.G. Jung and W. Pauli, The Interpretation of Nature and the Psyche ("Bollinger Series," Vol. LI; New York: Pantheon Books, Inc., 1955). Pauli agrees that Kepler was supporting the more quantitative attitude of modern physical science. Nevertheless, he insists that Fludd's attitude leads "from a psychological point of view to a greater completeness of experience. . . . Even though at the cost of consciousness of the quantitative side of nature and its laws, Fludd's 'hieroglyphic' figures do try to preserve a unity of the inner experience of the 'observer' (as we would say today) and the external process of nature, and thus a wholeness in its contemplation - a wholeness formerly contained in the idea of the analogy between microcosm and macrocosm but apparently already lacking in Kepler and lost in the world view of classical natural science." See p. 207.

²Robert Fludd, Utriusque cosmi, majoris scilicet et minoris, metaphysica, physica atque technica historia, Vol. I: De macrocosmi historia (Oppenheimii: J.T. de Bry, 1617), p. 701.

³Tractatus apologeticus integritatem societatis de Rosae Cruce defendens (Lugduni Batavorum: apud G. Basson, 1617).

which was used by the various Hebrew patriarchs, kings and prophets. It was then imitated by some of the ancient philosophers, of whom the first was Mercurius Trismegistus, whose knowledge of mysteries included that of recalling the dead to life, and of curing illnesses.⁴

In this same year, 1617, he published the first volume of his account of both cosmos, the macrocosmos and the microcosmos. This book attempted to develop a system of the universe that would replace the Aristotelian one, and hence brought him into conflict with others who were trying to do the same thing.⁵

The first attack on Fludd was made by Kepler in the appendix to his Harmonices mundi, which he added in order to criticize the world systems of both Ptolemy and Fludd. In his Mysterium cosmographicum, Kepler had put forward the idea that the spheres of the planets could be compared to the five regular solids. For this reason he disagrees with Ptolemy who had attempted to compare the prime numbers with the musical scale and with the planetary system. Kepler insists that his theory describes the motions of the heavenly bodies according to true quantitative reason and measure, and not by vain symbolization.⁶

⁴Ibid., pp. 5-6. ⁵Utriusque cosmi, op. cit.

⁶Johann Kepler, Harmonices mundi libri V (Lincii Austriae: sumptibus G. Tampachii, 1619). See the "Appendix habet comparationem hujus operis cum harmonices Cl. Ptolemaei libro III, cumque Roberti de Fluctibus speculationibus harmonicis, operi de macrocosmo et microcosmo insertis," p. 251.

Kepler criticizes Fludd also because the harmonies he gave were merely symbols and were more poetic and oratorical than philosophical or mathematical. While both men were interested in explaining the world according to mathematical proportions and harmony, Fludd took his harmonies from music, and maintained that the parts of the universe were related to each other in the same way numerically that musical notes were related. Kepler insists that this is simply arbitrary and unrelated to actual measurements. For example, Fludd described the relationship between the planets in terms of the musical scale. Kepler, in contrast, insists that his ideas of planetary proportions are based, not on an analogy with musical harmony, but on measurements of the motion of the planets made by astronomy. The harmony of the world as he saw it, was based, he felt, on observation of the actual world, while that of Fludd was not.⁷

The debate between Fludd and Kepler continued with the publication of Fludd in 1621 of Demonstratio quaedam analytica,⁸ with Kepler's reply in 1622 in an Apologia,⁹

⁷Ibid., pp. 253-54.

⁸Veritatis proscenium, in quo aulaeum erroris tragicum demovetur, seu Demonstratio quaedam analytica in qua cuilibet comparationis particulae, in appendice quaedam a Joanne Keplero nuper in fine harmoniae suae mundanae edita, factae inter harmoniam suam mundanam et illam Roberti Fludi respondetur (Francofurti: sumptibus J.T. de Bry, 1621).

⁹Prodromus dissertationum cosmographicarum, continens mysterium cosmographicum de admirabili proportione orbium

to which Fludd in turn replied in a Replicatio in 1622.¹⁰
 This part of the debate, however, does not concern us,
 since Mersenne does not discuss it.¹¹

In his Quaestiones celeberrimae in Genesim Mersenne likewise deals with the ideas of Robert Fludd as expressed in his book on the two cosmos. Fludd accepted the Cabalistic ideas that Mersenne rejected, making use of them to explain and interpret Genesis, and insisting that the order of the entire created world can be investigated through Cabalistic reason. For Mersenne, Fludd's Cabalism comes from banal philosophy and theology, or is simply false. It is not needed to interpret Genesis, for the Scriptural commentaries explain it clearly. There is nothing in these Cabalistic characters and letter manipulations, in this magic nonsense derived from Pierre d'Abano and Agrippa.¹²

Fludd had adopted from the Cabalistic tradition

coelestium, deque causis caelor numeri. Addita est item ejusdem Joannis pro suo opere Harmonices mundi apologia adversus demonstrationem analyticam cl. v. D. Roberti de Fluctibus (Francofurti: sumptibus G. Tampachii, 1621-1622).

¹⁰Monochordum mundi symphonicum, seu replicatio ad apologiam Joannis Kepleri adversus demonstrationem suam analyticam nuperrime editam (Francofurti: J.E. de Bry, 1622).

¹¹For a discussion of this debate, see W. Pauli, op. cit., pp. 194-200. In appendices I and II Pauli gives some selections and their translations from the two books of Fludd, pp. 213-36.

¹²Op. cit., col. 716.

the belief in guardian spirits which helped men like Pompey, Caesar, Alexander the Great and Darius to achieve greatness. This was accompanied by the belief in a great variety of angels and demons. Mersenne attacks the belief in these angels and demons on the grounds that they are not mentioned in Scripture. Both of these Cabalistic beliefs formed part of the theory of magic which Mersenne rejected.¹³

Mersenne quotes Kepler's statement that Fludd's representation of the world as explained by musical harmonies is poetical and oratorical rather than philosophical and mathematical. Fludd had answered Kepler's criticism, but Mersenne had not yet received the book.¹⁴

One part of Fludd's thought that Mersenne especially attacks was his belief in chiromancy, the idea that a man's fortune could be read in the palm of his hand. Fludd, says Mersenne, is "an insane hereticomagus" for believing this.¹⁵ For example, if from the palm of the hand it could be

¹³Observationes, op. cit., col. 222.

¹⁴Quaestiones celeberrimae in Genesim, op. cit., col. 1556.

¹⁵"Robertus ille Flud haereticomagus insanire mihi videtur, dum ait manum esse geniti, naturaeque veluti tabulam, in qua more occulto nativitatis mysteria sculpantur, & fatalia characteribus illis, & similibus a natura formatis . . . doctis revelentur." Ibid., col. 1743. Mersenne called Fludd many such names in his discussion of him. See note in Mersenne, Correspondance, I, 61-62.

predicted that a person would drown at sea, he could be warned against sea voyages. Mersenne had already inquired of his school, La Flèche, to see what the Jesuits thought about this idea, and had received an answer written by Father Christophe Brossard, in 1619, informing him that Chiromantic Astronomy was rejected by the church.¹⁶

In order to put Fludd to the test, Mersenne includes in Quaestiones celeberrimae in Genesim drawings of a pair of hands, and challenges Fludd to predict the fortune of the man whose hands are pictured.¹⁷ Fludd somehow discovered that the hands pictured were those of Gassendi, although Mersenne and Gassendi had not yet met at the time.¹⁸ Fludd claimed to have divined this by examining the lines in the hand. However, according to Gassendi himself, his predictions about Gassendi's life were not very good.¹⁹

In 1627 Mersenne published the first in a series of books on music, the Traité de l'Harmonie Universelle.²⁰ He

¹⁶Ibid., I, no. 6, Le P. Jacques Saint-Rémy à Mersenne, (3 octobre 1619), 40.

¹⁷Quaestiones celeberrimae in Genesim, op. cit., col. 1744.

¹⁸Mersenne, Correspondance, III, no. 231, Mersenne à Gassendi (5 janvier 1633), 355.

¹⁹Ibid., no. 238, Gassendi à Luillier (16 fevrier 1633), 377.

²⁰Traité de l'harmonie universelle où est contenue la musique théorique et pratique des anciens et des modernes, avec les causes des mathématiques (Paris: Guillaume Baudry, 1627). The author's name is given as le sieur de Sermes, which Lenoble points out is "un anagramme transparent du nom de Mersenne, qui parle plusieurs fois de cet ouvrage."

felt that other sciences had made progress in recent years, but that music, which was considered one of the mathematical sciences, had been neglected. He hoped to bring it to such a point that a musician could make use of sounds as opticians make use of colors. With this end in view, he intended to write an exact description of music.²¹

According to Fludd, there was a harmonic relationship among the heavenly bodies. There was, for example, an octave between the Earth and the Sun, and an octave between the Sun and the Empyrean, the last of the heavenly spheres, which was the home of God.²² Fludd saw a similar relationship among the elements, placing a tone between earth and water, between water and air, and between air and fire.²³ In both of these cases, says Mersenne, these proportions have no other foundation than their author's imagination. Instead, Mersenne devotes a few pages to showing how to compute the distances between the planets, and how to determine the magnitude of each one, taking into account the two different theories of Tycho Brahe and of Copernicus.²⁴ There is, of course, a great discrepancy. For Copernicus, the

Lenoble, op. cit., p. xvii.

²¹Traité de l'harmonie universelle, op. cit., p. 1.

²²Ibid., p. 442.

²³Ibid., p. 80.

²⁴Ibid., pp. 353-83.

radius of the sphere of the stars is 7,906,818 times the radius of the Earth. For Tycho it is only 14,000 times the Earth's radius.²⁵ According to both of these systems, however, Fludd is in error and his proportions the fruit of his imagination. He is mistaken in his measurements. For, if we follow the hypothesis of Tycho, "qu'il n'oseroit à mon advis rejeter," we find that there are only 1142 earth radii between the Earth and the Sun. Fludd's world harmony, Mersenne concludes, has no other foundation than his imagination, and no truth other than that of a symbolic analogy.²⁶

The idea of a world harmony Mersenne interprets as the order and harmonic proportion to be found in the fabric of the heavens and the elements, in their properties and movements. This point had been discussed by Kepler in his Harmonices mundi in which he disagreed with the ideas of Ptolemy and Fludd.²⁷ Kepler's harmony was based on quantitative relationships, i.e., on the motion and distances of the heavenly bodies. Fludd's was not, but was in degrees of matter and form, of light and darkness.

Fludd believed that there were two opposing poles, light and dark, the former being spiritual and good, the latter being material and evil. This he pictured by two

²⁵Ibid., p. 375.

²⁶Ibid., pp. 444, 446.

²⁷Ibid., pp. 67-68.

triangles. One triangle gave the relationship of form and matter, light and darkness. This triangle had its broad base on the earth, indicating that the greatest amount of matter and darkness was there. Its apex was in the heavens, showing that the least amount of matter and darkness was in the heavenly regions. Conversely, a second triangle with its base in the heavens and its point on the earth, represented the amount of light, spirit and form present in things. Mersenne accepted Kepler's approach and rejected Fludd's.²⁸

The use of musical relationships and harmony in explaining the heavens led to the question of the music of the spheres, a question that Mersenne took seriously.²⁹ For the stars to produce sounds, he says, there must be air or aether reaching from the Earth to the Firmament. If this is the case, as Tycho's followers believed, then, says Mersenne, it is possible to conclude that planets produce sound, just as cannon balls do during their passage through the air, although it is very difficult to determine what

²⁸ See Fludd, Utriusque cosmi, op. cit., pp. 21, 81, 89, 97, for diagrams illustrating this principle. Mersenne referred to them in several places. Quaestiones celeberrimae in Genesim, op. cit., cols. 1556, 1774, 1750. Traité de l'harmonie universelle, op. cit., pp. 74, 85.

²⁹ Lenoble thinks that because of the discussion of the harmony of the world and the music of the spheres, "ce Traité n'ajoute rien à la gloire de Mersenne, et nous n'aurons guère l'occasion de le citer." Lenoble, op. cit., p. 369n.

this sound is, in the case of the planets, because of their immense size and speed.³⁰ It may be that we do not hear it because we are accustomed to it from before birth, or because it is too far from us, or too high-pitched or too low-pitched, or too loud. We do not hear the sound of ants when they run because it is too soft. In the same way, we may be incapable of hearing a sound which is too loud.³¹

The first controversy that arose in reaction to Mersenne's comments on Fludd and on the Cabala, began with a criticism of Mersenne's statements in Quaestiones celeberrimae in Genesim in a book published in 1625 by Jacques Gaffarel, the Abdita divinae Cabalae mysteria.³² There he criticizes Mersenne for rejecting the validity of Onomancy and then giving various onomantic alphabets himself. He accuses Mersenne of criticizing the idea of onomancy so lightly that he seems more to establish it, and of teaching the alphabets of the onomancers which he says should be ignored.³³

³⁰Traité de L'harmonie universelle, op. cit., pp. 72-73.

³¹Ibid., p. 348.

³²Abdita divinae cabalae mysteria, contra sophistarum logomachiam defensa (Parisiis: H. Blageart, 1625).

³³Ibid., p. 66.

He takes Mersenne to task for criticizing Fludd and other men learned in the Cabala, for calling them names, and judging them worthy of unheard of punishments. The main source of Gaffarel's criticism was his belief that there was much value in Cabalism. He insists that Mersenne was wrong in asserting that the Cabalists believed in the transmigration of souls. He maintains also that Cabalism is not to be equated with Onomancy, as Mersenne, who saw in them both diabolical divination and demonic art, had suggested. Cabala, says Gaffarel, was rather a way of expounding Scripture and of elevating men's minds to sublime and heavenly things and to the contemplation of the devine.³⁴

On the 10th of July, 1625, Nicolas-Claude Fabri de Peiresc, at Aix, wrote to his brother in Paris that Mersenne had read Gaffarel's attack "sur le sujet de la Cabale" and that he had written a reply.³⁵ The reply, in the form of a letter addressed to Peiresc, was a strong attack on Gaffarel.³⁶ Mersenne did not sign his own name to the pamphlet, so that some confusion existed as to its author.³⁷

³⁴Ibid., pp. 67, 36.

³⁵Mersenne, Correspondance, I, no. 31, Peiresc à Palamede de Vallavez (10 juillet 1625), 234.

³⁶Mersenne, De Gafarello judicium ad Clarissimum Dominum de Peiresc, Abbatem de Aquistria et Senatorem Aquensem (n.p., 1625).

³⁷Tamizey de Larroque, "Question," Revue d'histoire littéraire de la France, III (1896), 640, calls it a

DeWaard, however, has successfully identified it as written by Mersenne.³⁸ Lenoble concurs in this conclusion.³⁹ Mersenne attacks Gaffarel for his championship of Cabalism. He also announces that Father François de La Noue, a Minime, was writing an answer to Gaffarel. Mersenne, as was typical of him in his earlier life, was very liberal with the use of uncomplimentary adjectives, which he applies to Gaffarel: "scurrilous book, arising from the brain of an insane man," "crazy," "ignorant," "stupid," "his family are innate fools." He insists that Gaffarel does not understand Cabala, pointing out some of Gaffarel's errors in the numerical values of Hebrew letters. He also cites six Cabalistic sources for the idea of the transmigration of souls.⁴⁰ Perhaps it was as well that this letter was not published in Mersenne's name, or the reconciliation between the two which came a few years later, might not have taken place.

Another friend of Mersenne's, Claude Bredeau, a lawyer, with whom Mersenne had struck up a friendship

"diatribe," and says the name of the author "s'est enveloppé de l'ombre la plus impénétrable."

³⁸ See his note in Mersenne, Correspondance, I, 303.

³⁹ Lenoble, op. cit., p. xv.

⁴⁰ Mersenne, Correspondance, I, no. 39, Mersenne à Peiresc (13 novembre 1625), 303-306.

while living at Nevers, and with whom he corresponded regularly until Bredeau's death in 1628, supported Mersenne. Bredeau comments that Gaffarel is too attached to words and ignores the explanation of things.⁴¹ This was a valid perception. Cabalists were preoccupied, as we have seen in the last chapter, with developing a science out of word and letter manipulations and the mathematical relationships between them. Mersenne was more concerned with the mathematics of motion.

Gaffarel was a friend of Gassendi's and wrote to him complaining that Mersenne had not acted as a monk should, avoiding vanity and practicing humility, but had instead violently attacked Veneti and other Cabalists. He insisted also that Mersenne was ignorant of the secret language in which the Cabala was written.⁴²

In 1629 Gaffarel published another book, Curiositez inouyes, sur la sculpture talismanique des Persans.⁴³ It defends the idea of talismans that Mersenne had so vigorously denounced. The book got Gaffarel into trouble with the Sorbonne which condemned it and forced him to sign a

⁴¹Ibid., no. 63, Bredeau à Mersenne (19 juillet, 1626), 483.

⁴²Ibid., no. 122, Gaffarel à Gassendi (fin de 1628), 168.

⁴³(Paris: H. Du Mesnil, 1629).

retraction on pain of excommunication.⁴⁴ When Mersenne asked his friends for their comments on the book, Descartes replied simply, "je juge par le titre qu'il ne doit contenir que des chimères."⁴⁵

Mersenne also consulted another whose acquaintance he had made not long since. This was Johann Baptista van Helmont, a Brussels doctor and chemist, who styled himself medicus Hippocraticus et Hermeticus.⁴⁶ Van Helmont advocated many of the Hermetic ideas that Mersenne had already rejected so vigorously. Van Helmont became interested in Mersenne through Gassendi's recommendation, and a correspondence was soon established between them. The first extant letter, exchanged between them in 1630, contains some medical advice to Mersenne prescribing "une remède planetaire qui puisse transplanter les irradiations adversaires."⁴⁷

In his Curiositez inouyez Gaffarel had criticized a favorite idea of Van Helmont's, that of a marvellous ointment which would cure wounds when applied to the sword that had

⁴⁴Censura Sacrae Facultatis Theologiae Parisiensis, Retractio Jac. Gaffarelli auctoris libri des curiositez inouyes (Paris: Jean Guillemot, 1629), p. 1, non pag.

⁴⁵Mersenne, Correspondance, I, no. 139, Descartes à Mersenne (8 octobre 1629), 302.

⁴⁶Ibid., I, 496n.

⁴⁷Ibid., no. 162, Van Helmont à Mersenne (juin 1630), 497.

inflicted the wound, and had called it a demonic superstition.⁴⁸ Van Helmont, therefore, felt free to criticize Gaffarel's ideas and sent Mersenne a list of the errors he found in the book. The list indicates that Van Helmont and Gaffarel were closer together in their ideas than were Mersenne and Van Helmont. Both Van Helmont and Gaffarel accepted the idea of talismans, but Van Helmont insisted that it was the power of the imagination that draws the influence of the stars into the talisman, and that it does not simply depend on the location of the stars and on the use of Hebrew letters, as Gaffarel maintained. It is this power which is the source and foundation of natural magic and of the Cabala, and not the Hebrew alphabet. All the alphabetic part of the Cabala that Gaffarel uses is sorcery. It is ridiculous to try to read the stars by use of the Hebrew alphabet.⁴⁹

Despite all the disagreement and the violent language that both Mersenne and Gaffarel used against each other, they were able eventually to reconcile their feud and become friends. The reconciliation seems to have taken place

⁴⁸Ibid., pp. 499-500. Van Helmont got into trouble because of his Hermetic ideas, and his book De magnetica vulnerum curatione (Paris, 1621), was condemned by various medical faculties and the Church. As a result, Van Helmont spent several years in jail.

⁴⁹Mersenne, Correspondance, I, no. 168, Van Helmont à Mersenne (26 septembre 1630), 533, 536.

sometime in early 1632, probably at the encouragement of Gassendi.⁵⁰ In May of 1632, Mersenne visited Gassendi who was in Paris at the time, and found him writing a letter to Naudé. Upon request, Gassendi included a greeting to Gaffarel from Mersenne.⁵¹

Later, we find Gaffarel writing to Mersenne from Rome and sending him pictures of some musical instruments.⁵² He also carried with him a letter from Mersenne to Naude who was also in Rome in 1633.⁵³ The friendship was a lasting one, for we find Gaffarel sometime before 1641 writing to return Mersenne's copy of the Zohar, a Cabalistic book, and sending him at the same time, a book on Hebrew letters.⁵⁴

Mersenne was not so fortunate in his dispute with Fludd, which continued until the death of the latter in 1636. The criticisms which Mersenne had levelled at Fludd in his Questiones celeberrimae in Genesim were called to Fludd's attention in 1626 by a letter listing the references

⁵⁰Ibid., III, 313n.

⁵¹Ibid., no. 221, Gassendi à Naudé (11 mai 1632), 312.

⁵²Ibid., no. 258, Gaffarel à Mersenne (juin 1633), 443.

⁵³Ibid., no. 287, Naudé à Mersenne (12 novembre 1633), 533.

⁵⁴Ibid., VI, no. 640, Gaffarel à Mersenne (entre 1631 et 1641), 369.

to him in Mersenne's book.⁵⁵ Whereupon Fludd apparently read the book, and took exception to Mersenne's comments. Mersenne had quoted Kepler's remark that Fludd's world music was mere poetic and oratorical symbolism. Fludd felt that this allegation of Kepler's had already been answered. Mersenne, he says, is just bawling and quarreling like an old woman. He retaliates, therefore, in kind, calling Mersenne a lying, hypocritical, impotent monk.⁵⁶

One of Fludd's chief criticisms of Mersenne is that he clings to Aristotle like an oracle. He almost makes a Christian out of him, whereas Fludd insists that Aristotle is opposed in almost everything to Christian ideas. If Aristotle points to the truth, why not reject the Scriptures? But, says Fludd, it is the Scriptures that are true, and not Aristotle.⁵⁷

Actually, Fludd preferred other authorities to Aristotle, and cites them, especially Trismegistus, in favor of the doctrine of a World Soul, which Mersenne rejected.⁵⁸

Fludd also lists a variety of reasons for Mersenne's

⁵⁵Robert Fludd, Sophiae cum moria certamen, in quo lapis lydius a falso structore Fr. Marino Mersenno reprobatus, celeberrima voluminis sui babylonici (in Genesim) figmenta accurate examinat (n.p., 1629), p. 9.

⁵⁶Ibid., pp. 29-30.

⁵⁷Ibid., p. 33.

⁵⁸Ibid., pp. 41-42.

calling him a "cacomagus"; some of them he accepts, others he rejects. For example, Mersenne condemns him for using magic. Fludd admits that he does, but says that magic is a Persian word meaning Wisdom, and applies to natural philosophy, i.e., to science. Others have defiled the term by applying it to demonology, but he should not be condemned because of them. We have already seen that Mersenne refused to accept the distinction between "good" and "bad" magic, because he would not accept the idea that there were guardian angels, or genii, whose power could be made use of. He denied their governance and custodianship of the world. In answer Fludd reiterates his belief that this can be done by the use of the letters of the Hebrew alphabet, and by various talismans, and that this is the source of many of the miraculous events reported in history.⁵⁹

These differences between Fludd and Mersenne grew out of their opposite views of science, and were basic differences of opinion.

Fludd's books, with their answering attack on Mersenne, seem to have upset Mersenne a great deal. He apparently asked his friends to advise him what to do about it,

⁵⁹Ibid., pp. 75-77. Fludd repeats these disagreements with Mersenne in a second book published at the same time, Summum bonum, quod est verum magiae, cabalae, alchymiae verae, fratrum Rosae Crucis verorum, subjectum, in dictarum scientiarum laudem, et insignis calumniatoris fratris Marini Mersenni dedecus publicatum per Joachimum Frizium (n.p., 1629), pp. 5-6.

and received two contradictory answers. One group told him to ignore Fludd's attacks and not attempt to answer comments unworthy of response. The other group said that to ignore the charges would harm his reputation. He resolved this difference of opinion by getting his friends to answer for him. In this way, he says, he satisfied both groups.⁶⁰

The correspondence of Mersenne's friends, however, reveals that he was more concerned than this statement would seem to indicate. Gassendi, in writing to Peiresc in 1628, says that he has just received a letter from Mersenne asking for some of his astronomical observations. This is just a pretext, Gassendi feels; what Mersenne really wants is Gassendi's opinion of Fludd. Though a study of Fludd is not to his taste, he feels he must oblige his old friend.⁶¹ He later told others also that he had decided to help Mersenne answer Fludd's books.⁶²

Gassendi's response was in the form of a letter to Mersenne, who gave it to another friend, La Mothe le Vayer, to divide into sections and assign headings to each one.⁶³

⁶⁰Pierre Gassendi, Theologi epistolica exercitatio, op. cit., p. aij verso.

⁶¹Mersenne, Correspondance, II, no. 120, Gassendi à Peiresc (2 décembre 1628), 148-49.

⁶²Ibid., no. 123, de Valois à Peiresc (28 janvier 1629), 172.

⁶³Gassendi, Theologi epistolica exercitatio, op. cit., p. e verso.

Mersenne had the letter published, adding to it not only a letter on Fludd written by a fellow Minime, François de La Noue, but also a letter of introduction of his own, despite the fact that he was not going to answer Fludd himself. The book was published by Sebastien Cramoisy, one of the most influential publishers of the ancien régime.⁶⁴

Mersenne's introductory letter summarizes Fludd's ideas in six points. First, Fludd teaches that the Bible, when interpreted mystically, is an explanation of Alchemy and of the Philosopher's Stone. Secondly, God is a Light diffused throughout the whole world, but not penetrating anything, without assuming the vestments of an aethereal spirit drawn from Alchemy, called the Quinta essentia. Thirdly, this aether which is God and the Holy Spirit, is the World Soul. The purest part of this Soul is the Angelic nature and the Empyrean. All souls of men or animals are a part of the same soul. Fourthly, this World Soul is the Messiah, the Savior, the Christ, the Corner Stone and the Universal Rock (petra) on which the church is founded. It is the chief part of the Philosopher's stone, which, when thickened, turns red, and accordingly is said to be the blood of Christ. Fifthly, the just man is the Alchemist, who, when he finds the Philosopher's Stone, uses it for

⁶⁴Henri Jean Martin, "Un Grand Editeur Parisien au XVII^e Siècle, Sebastien Cramoisy," Gutenberg Jahrbuch, XV (1957), pp. 179-88.

his immortality. Sixthly, creation is not ex nihilo. It is from matter, called darkness. Moses was an Alchemist when he described the creation of the world. Other Alchemists include the Cabalists, Magicians, Philosophers and Priests.⁶⁵

Perhaps Mersenne felt that these ideas needed no comment, or perhaps he was trying to leave it to his friends. He does, however, mention some specific points wherein he disagrees with Fludd. For instance, because of his belief that whatever has more light, heat and aethereal spirit is lighter, Fludd insisted that a living body weighed less than a dead one. Here was a point at which his theories could be put to the test, and apparently Mersenne had done so. He states specifically that a dead dog weighs about the same, or a little less than a living one.⁶⁶ He also cites Sanctorius' experiment in which he weighed a man just before he died and again just afterward. Sanctorius, he concludes, found that the man weighed a little less after death.⁶⁷

Finally, Mersenne deals with the question of the authorities Fludd cites in support of some of his ideas.

⁶⁵Gassendi, Theologi epistolica exercitatio, op. cit., pp. aii recto - aiii verso.

⁶⁶See Mersenne, Correspondance, III, no. 205, Mersenne à Jean Rey (1 septembre 1631), 190, where Mersenne reports an experiment on a dog and a chicken, which shows that the animals do not weigh more when dead than while alive.

⁶⁷Gassendi, Theologi epistolica exercitatio, op. cit.

One of these, St. Thomas, commented on heavenly influences, but, says Mersenne, he did not intend to imply that metals or stones received these influences. As for other authorities, such as the "Pseudo-Trismegistus", Mersenne believes that Fludd would change his opinion if he were to read Casaubon's work. Then too, Fludd's ideas were similar to those of Kunrath, who had been censured by the Sorbonne.⁶⁸

In the main body of the text, Gassendi begins with a few preliminary remarks concerning the controversy between Fludd and Mersenne, asserting that the latter had been too harsh in the language he used to discuss Fludd. Then he proceeds to summarize Fludd's ideas, trying to present them as fairly as possible. He goes on to raise some basic questions about Fludd's ideas. Fludd had tried to make a distinction between "good" and "bad" magic, and to insist that his ideas were "good" magic. Gassendi rejects this distinction. The term "magic", he says, is generally understood to mean some marvellous event. There are some men, e.g. some politicians, who evince such a skill and shrewdness that the popular mind can scarcely attribute it to the human mind. This, however, is not true magic. Nor are tricks and prestidigitation. Magic has to do with events caused by spirits and powers, or, as Fludd says, genii. These genii, Fludd thinks, are

⁶⁸Ibid.

attached to certain men and help them, but they are not demons, nor is their use a demonic art. We are simply quibbling here about terminology, says Gassendi. This kind of meaning for the word magic is magic in the "bad" sense, and Mersenne was right therefore in calling Fludd a "cacomagus."⁶⁹

Gassendi accepts the idea that the Creator had a reason for locating things where he did; in other words, he accepts the idea of a world harmony. He is unwilling, however, to accept Fludd's system of world harmony, because it was not determined by observation.⁷⁰ Gassendi thought, as did Kepler and Mersenne, that Fludd's harmonic relationships were merely symbolic. In contrast, Mersenne interprets the harmonic laws by quantity and number taken from the measurement of magnitude, distance and motion.⁷¹

Gassendi, likewise, does not accept Fludd's claims that his Physics was drawn from Scripture. The Bible, insists Gassendi, is concerned with Salvation, and ignores natural topics. For example, Christ was silent about the prime matter or the fifth essence. Moses also said nothing about epicycles or eccentrics and contented himself with stating that God created the heavens and the earth. It is not that Moses could not have taught Physics had he wanted

⁶⁹Ibid., pp. 146-50.

⁷⁰Ibid., p. 104.

⁷¹Ibid., pp. 71-72.

to. He simply preferred instead to accommodate his writing to the knowledge of those who would read the Scripture.⁷²

To defend Mersenne against Fludd's claim that he had drawn his scientific ideas from the Bible, was easy for Gassendi. He had difficulty, however, in trying to defend Mersenne from Fludd's charge that he was too Aristotelian, for Gassendi himself had just recently published an attack on Aristotle.⁷³ He got around this by defending the possibility of pagan knowledge in general. It is true, he agrees with Fludd, that God revealed the knowledge of Salvation in Scripture, but He also gave some ability to the pagans. Fludd himself owed much to them, such as geometry and arithmetic. He refers also to his own pagan authorities, such as Trismegistus, Orpheus and Plato.⁷⁴

Fludd's use of authorities other than the Scriptures was one of the reasons for Mersenne's criticism. Gassendi took up the same problem, i.e., the names of the various angels which were not to be found in the Bible.

⁷²Ibid., pp. 96-97.

⁷³Exercitationes paradoxicae adversus Aristoteleos, in quibus praecipua totius peripateticae doctrinae atque dialecticae fundamenta executiuntur; opiniones vero aut novae aut ex vetustioribus obsoletae stabiliuntur, Liber I: In doctrinam Aristoteleourm universe (Gratianopoli: Verdier, 1624).

⁷⁴Theologi epistolica exercitatio, op. cit., p. 115.

The names were said by the Cabalists to have been given by Moses to the seventy Elders of Israel, but not revealed to the common man. They were then passed down through the secret tradition claimed by the Cabalists. The crux of the matter, says Gassendi, is whether or not those who gave these names to the angels, were divinely inspired. He does not believe that they were, and insists that no proof to the contrary can be given.⁷⁵

The letter written by La Noue criticizes Fludd for the same things. He rejects, for example, Fludd's attempt to found his science on the Scriptures. He, too, refers to the Sorbonne's censure of Kunrath for trying to base his chemistry on the Bible. The ancient arts which Fludd is trying to revive, says La Noue, have already been condemned by the Church, including all the names of the angels.⁷⁶

As for Aristotle, La Noue sees no need to defend him from Fludd who has merely called him names, and not attempted to refute him.⁷⁷

He condemns certain specific doctrines of Fludd as contrary to the teachings of the Church, among them, the idea that the World Soul is God, that the Holy Spirit is a mortal soul, that God is in all things, that matter

⁷⁵Ibid., pp. 164-65.

⁷⁶Ibid., pp. 175-76.

⁷⁷Ibid.

is co-eternal with God. Moreover, Fludd's system makes God the author of sin.⁷⁸

Many were interested in the book and wanted a copy as soon as it came off the press.⁷⁹ Even Galileo read it with interest.⁸⁰ Fludd wrote an answer to it, which Naudé heard of even in Rome.⁸¹ Gassendi, however, did not want to reply to Fludd's answer, and hoped that it would not upset Mersenne if he did not.⁸² As Gassendi anticipated, Mersenne again asked him for his feelings about Fludd,⁸³ but Peiresc advised Gassendi not to respond again, because he had better things to do.⁸⁴ Gassendi had read the book, for he summarizes its main points for Naudé,

⁷⁸Ibid., pp. 177.

⁷⁹Mersenne, Correspondance, II, no. 164, Gassendi à Peiresc (21 juillet 1630), 508; no. 169, Naudé à Gassendi (31 octobre 1630), 541; no. 175, Heneri Reneri à Gassendi (26 novembre 1630), 575; III, no. 190, Gaspard Gevaert à Gassendi (30 janvier 1631), 51.

⁸⁰Ibid., no. 233, Galileo à Elia Diodate (15 janvier 1633), 368.

⁸¹Robert Fludd, Clavis philosophiae et alchymiae Fluddanae ad epistolicam Petri Gassendi exercitationem responsum (Francofurti: apud G. Fitzerum, 1633). Mersenne, Correspondance, III, no. 215, Naudé à Gassendi (6 mars 1632), 266.

⁸²Ibid., no. 234, Gassendi à Luillier (20 janvier 1633), 371.

⁸³Ibid., no. 235, Gassendi à Luillier (31 janvier 1633), 372.

⁸⁴Ibid., no. 240, Peiresc à Gassendi (25 février 1633), 379.

but he did not respond to it.⁸⁵

In addition to Gassendi and La Noue, Mersenne asked still others for their opinion of Fludd. Van Helmont answered that he had known Fludd in England and that he was a bad doctor and a worse Alchemist, that he was "garralus, stentor, superficialiter doctus, parum sui constans." He had leafed quickly through Fludd's books but had not found anything in his "dreamy" arguments worth amusing himself with for long. This indeed was short shrift from one who also believed in a World Soul and in its powers.⁸⁶

As a concluding note to the controversy, Father Jean Durelle, a Minime, wrote an answer to Fludd in 1636.⁸⁷ By this time, however, Mersenne was involved in another controversy that was occupying his attention even more fully. This was the storm of discussion which arose over Galileo's censure by the Church. Mersenne was by this time devoting most of his time to defending a scientific point of view that he had finally come to accept, rather than to attacking one that he considered invalid.

⁸⁵Ibid., IV, no. 279, Gassendi à Naudé (septembre 1634), 350.

⁸⁶Ibid., III, no. 192, Van Helmont à Mersenne (6 février 1631), 75-78.

⁸⁷Effigies contracta Roberti Flud. In lucem producente Eusebio a S. Justo (Lutetia: apud G. Baudry, 1636). See Mersenne, Correspondance, VI, 334 for a note on the author of the book.

CHAPTER VII

GALILEO AND THE NEW SCIENCE

When Mersenne first began to publish, he apparently knew very little about Galileo. The only references to him in Quaestiones celeberrimae in Genesim are to his Sidereus nuncius and to the observations he had made of the heavens by means of the telescope.¹ In the preface Mersenne included Galileo in his list of those who criticize Catholic scholars for relying too heavily on Aristotle.² Since all of these references are very brief, we may conclude that Mersenne knew little about him.

Galileo was a supporter of the Copernican hypothesis. We have already discussed Mersenne's attitude to this as expressed in Quaestiones celeberrimae in Genesim. He wanted better proof than then existed before he would accept it as a true hypothesis, and since the Church had condemned it, he rejected the theory as a description of

¹Quaestiones celeberrimae in Genesim, op. cit., cols. 163, 686, 1075. Observationes, op. cit., col. 161.

²Quaestiones celeberrimae in Genesim, op. cit., p. e.

the true nature of things. Nevertheless, he thought it might be useful. From this beginning his interest grows.

In the year following the publication of Quaestiones celeberrimae in Genesim, Mersenne published another large work, L'Impiété des déistes, directed primarily, as we have seen, against the deists whom he had begun to criticize in the earlier work. In this book we find a few references to the Copernican system, which, he says, is such common knowledge, that we can scarcely find anyone who does not know it. Mersenne reaffirms that he is not a Copernican, and that he follows Tycho because of the accuracy of the latter's observations. Nevertheless, he believes that many useful conclusions can be drawn from the Copernican hypothesis; for example, that the planets move faster the closer they are to the Sun.³

One problem that had arisen with the Copernican theory was that no parallax could be observed in the stars. That is, if the Earth moved in an orbit around the Sun, as Copernicus maintained, the stars would appear to be situated differently when seen from the Earth at diametrically opposite points of its orbit around the Sun. Copernicus had explained this lack of parallax by suggesting that the stars are so far distant from the Sun and the Earth that the Earth's orbit is relatively insignificant, and thus no

³L'Impiété des déistes, op. cit., II: 187-88, 194.

parallax can be observed. Copernicus' answer meant expanding the universe greatly beyond the size it had hitherto been assumed to be. Mersenne's comment on this problem takes the form of a question: is it possible to prove Copernicus wrong because he places Saturn, the planet farthest from the Sun, at an immense distance from the stars? His answer is that, even if the stars were 100,000 times further away than even Copernicus believed, we could not contradict his explanation since we can observe no parallax, to aid us in deciding.⁴

In a brief reference to Galileo in the same work, Mersenne attributes to Galileo the statement that there are other worlds which the Sun also illuminates. His answer to this is that we marvel at the works of God for which we can give no other reason than his good pleasure. It is folly to try to discover why God wished the Sun to be bigger and higher than the Moon. We must content ourselves with the hope that in a future life we will know why God made the world as it is.⁵

In 1625 Mersenne published La Vérité des sciences. The first part of this two volume work attempts to deal with the scepticism which could result from man's inability to understand the "whys" of the universe. As we have seen in chapter five above, Mersenne rejected the sceptical

⁴Ibid., p. 199.

⁵Ibid., pp. 271, 275.

conclusion, on the grounds that there are certain things that we do know and accept, and hence sought another answer. One of the arguments of the sceptics was that we do not know if there are stars or systems of stars other than the ones we see. Another of their arguments was that the Sun appears to us no larger than a foot in diameter, and we cannot even say for certain whether it moves or is at rest.⁶ Mersenne's answer to these is that we do not rest content with just our sense impression to determine the size of the Sun, but we correct it by the use of reason, employing, for example, the ideas of geometry. Mersenne was forced, however, to accept the conclusion that we cannot decide about the movement of the heavens.⁷

The remainder of La Vérité des sciences is a discussion of various branches of mathematics given for the purpose of showing that there are many things which we do know with certainty to be true. Mersenne felt that the answer to scepticism in the area of natural philosophy should come by way of mathematics.

In the following year, 1626, Mersenne published a collection of mathematical papers in order to make more readily available the valuable work of the past on mathematical subjects. It includes the works of such authors

⁶La Vérité des sciences, op. cit., pp. 7-9.

⁷Ibid., pp. 14-20, 194.

as Archimedes, Theodosius, Apollonius Pergaeus, Menalaeus, Maurolicus and others.⁸

In 1627 Mersenne published the Traité de l'harmonie universelle in which he discusses, besides many musical questions, the idea of the harmony of the universe. He preferred Kepler's harmony based on mathematical proportions to Fludd's based on musical relationships.⁹

In his discussion of astronomical measurements, Mersenne preferred to follow Tycho, but because many favored Copernicus, Mersenne also gave the calculations based on that hypothesis. After giving diagrams showing both systems, he explained that, according to Tycho, the distance from the Earth to the stars is 14,000 times the radius of the Earth, while for Copernicus, the distance is around 8,000,000 times the radius of the Earth. The stars would in consequence be much bigger in Copernicus' hypothesis than in Tycho's.¹⁰ Once again Mersenne has contented himself with explaining both systems, while retaining the opinion that neither can be definitely proved or rejected.

Kepler's work had received a good deal of attention

⁸Synopsis mathematica ad Reverendiss. Patrem Simonem Bachelier, Ordinis Minimorum Generalem (Paris: Ex officina Rob. Stephani, 1626).

⁹Op. cit., p. 352. See Chapter IV above.

¹⁰Traité de l'harmonie universelle, op. cit., pp. 372-73, 375.

from Mersenne by this time, but he has still paid little attention in his books to Galileo. If we turn to his correspondence we find that Mersenne was just becoming increasingly interested in Galileo during this period. Perhaps his failure to devote more attention to Galileo was the result of a lack of sufficient information about him.

According to his own testimony, Mersenne tried to enter into correspondence with Galileo around 1625 or 1626, but he was unsuccessful.

In several of the letters of this period Mersenne and his friends, especially Robert Cornier, were dealing with problems in mechanics. One such problem which Mersenne and Cornier discussed was whether a cannon ball fired straight up into the air falls back to the same spot from which it was fired. We recognize the theoretical importance of this question from the use Mersenne had made of it in discussing Copernicanism in Quaestiones celeberrimae in Genesim. Cornier reports that he had been assured by someone in the army who had seen it happen several times, that the cannon ball would fall back to the same spot. Nevertheless, he thought it an experiment worth repeating.¹¹

We do not find Galileo's name mentioned in any of the letters of this period dealing with problems in

¹¹Robert Cornier à Mersenne, 29 juillet 1625, no. 32, Correspondance, op. cit., I:236.

mechanics. Galileo had dealt with problems of this nature in a manuscript written in 1599, but we may assume that it was as yet unknown to Mersenne.

By 1627, however, we find Cornier referring to a book of Galileo's which Mersenne had mentioned to him in a letter.¹² Elio Diodati, a Protestant living in Paris, had become very interested in Galileo. In 1627 he returned from a visit to Italy and described the various inventions of Galileo to the scientific circles in Paris.¹³ It was presumably from him that Mersenne heard of Galileo's most recent work, a book on the motion of the Earth, which he referred to as the de motu terrae. Mersenne inquired about this work from a friend in Rome, asking if it had been published yet. He had heard that the manuscript had been read and approved by the Pope.¹⁴

By the end of 1627 Galileo's books were being read in Paris. This is evident from some comments made by Cornier, who disagreed with some of Galileo's conclusions.¹⁵ He did not disagree entirely, however, for we find him

¹²Cornier à Mersenne, 15 novembre 1627, no. 80, Ibid., 594.

¹³See the Note by DeWaard, Ibid., p. 600.

¹⁴Mersenne à Luc Holste, novembre 1627, no. 81, Ibid., 603.

¹⁵Cornier à Mersenne, 24 decembre 1627, no. 83, Ibid., 611.

expressing the hope that others would write books that would support Galileo's ideas on the movement of the Earth.¹⁶

Mersenne's growing interest in Galileo is seen in the letter which he wrote to him in 1629, encouraging him to make his ideas available for publication. Mersenne said that he had heard that Galileo was writing a book on the motion of the Earth, which "because of the prohibition of the Inquisition, you cannot publish."¹⁷ If Galileo would send the manuscript to Mersenne, he promised to get it published for him.¹⁸ Galileo, however, did not send the book to Mersenne. Instead, he had the book published himself in Italy in 1632 under the title Dialogo dei Massimi Sistimi. The book caused a severe reaction on the part of the Church, and its publication was stopped in August of the same year. Galileo, however, had already sent copies of it to various friends in France. In November, Gassendi wrote to Galileo that he had received the book.¹⁹ Diodati

¹⁶Cornier à Mersenne, 14 janvier 1628, no. 87, Ibid., II:3.

¹⁷"Ob prohibitionem Inquisitionis non possis divulgare." Mersenne à Galileo, 1^{er} février 1629, no. 134, Ibid., 175. This statement seems to contradict Santillana's thesis that Galileo did not know that he was prohibited from teaching the Copernican hypothesis. See Santillana, The Crime of Galileo, op. cit., pp. 261-74.

¹⁸Mersenne à Galileo, 1^{er} février 1629, no. 134, Correspondance, op. cit.

¹⁹Pierre Gassendi à Galileo, 1^{er} novembre 1632, no. 226, Ibid., III:335.

in Paris was sent a copy, and Peiresc was forwarding one to the Dupuy brothers in Paris.²⁰

By August 1633, news of Galileo's trial had reached France. It was not long in spreading throughout Europe, causing grave concern in many quarters. One of those whose work was disrupted by the news was Descartes. Descartes had tried to avoid becoming involved with theology. This was not easy for someone who wanted to discard Aristotle, because theology was so bound up with Aristotle, he said, that it was hard to put forward another view without seeming to attack the Faith.²¹ Nevertheless, he insisted, he was no theologian, for theologians were concerned with revelation, and he was not.²² Despite these comments, however, Descartes was anxious to reconcile his own ideas about the world with those of the book of Genesis. This he was able to do, he maintained, by using a metaphorical rather than a literal interpretation.²³

Descartes was just finishing his first book, Le Monde, and had already promised to send at least a part of

²⁰See the Note by DeWaard, Ibid., p. 337.

²¹Rene Descartes à Mersenne, 18 décembre 1629, no. 145, Ibid., II:336.

²²Descartes à Mersenne, 15 avril, 1630, no. 155, Ibid., 430; 6 mai 1630, no. 158, Ibid., 482.

²³Descartes à Mersenne, 23 décembre 1630, no. 180, Ibid., 598; 14 octobre 1630, no. 183, Ibid., 618.

it to Mersenne, when news of the burning of Galileo's book in Rome reached him. It made him consider burning his own papers, or, at least, not allowing anyone to see them. He believed the idea that the Earth moves so important, that if it were false, so likewise was the entire foundation of his philosophy. But, since he would not for anything in the world publish something containing the least word that offended the Church, he would prefer to suppress it rather than publish a mutilated version.²⁴

A few months later Descartes wrote to Mersenne that he had decided to suppress his own book entirely, even though this would mean the loss of almost four years' work, in order to render complete obedience to the Church, which had banned the idea of the movement of the Earth.²⁵ He knew, he said, that a decision by the Inquisitors at Rome did not immediately become an article of faith. That required the authorization of the Pope or of a Council of the Church.²⁶ Nevertheless, he did not want to have to rely on such an interpretation in order to be able to maintain his views. He would continue to hope, however, that another

²⁴Descartes à Mersenne, 28 novembre 1633, no. 291, Ibid., III:558.

²⁵Descartes à Mersenne, février 1634, no. 307, Ibid., IV:27-28.

²⁶Descartes à Mersenne, février 1634, no. 317, Ibid., 50-51.

decision would be forthcoming, and then he could publish his Le Monde. Until then, having seen a copy of the condemnation of Galileo, published at Liège on September 20, 1633, he feared that the prohibition extended even to using the Copernican hypothesis for mathematical calculations in astronomy.²⁷

The loss of some letters written by Descartes to Mersenne just at the time when Descartes intended to send the latter a copy of his book made him fear that someone was trying to get hold of the manuscript. He had also failed to receive four or five of Mersenne's letters. He advised Mersenne, therefore, that they should both be careful to say nothing that they did not want the whole world to know.²⁸

In August, 1634, Descartes had a short visit from Beeckman, who loaned him his copy of Galileo's book. During the thirty hours that he had the book, Descartes was able to leaf through it and was not too impressed. Galileo, he said, had tried to explain the tides by the motion of the Earth. Descartes himself had done this in Le Monde, but in a different way. He thought that Galileo's reasons for proving the movement of the Earth were very good,

²⁷Descartes à Mersenne, 1^{er} mai 1634, no. 329, Ibid., 102.

²⁸Descartes à Mersenne, 15 mai 1634, no. 336, Ibid., 140.

except that the latter digressed too often to be as persuasive as he might have been.²⁹ Thus, although Descartes seemed at this point to agree with the idea of the movement of the Earth, when he later summarized in the Discours de la Méthode the ideas in Le Monde, he very carefully left out any such references.³⁰ And by the time he wrote his Principes de la Philosophie he had developed his vortex theory, by which he could state that the Earth was at rest in the center of a vortex, and thus "deny the motion of the Earth more carefully than Copernicus, and more truthfully than Tycho."³¹

In a letter to André Rivet, a Protestant professor of theology at the University of Leiden, with whom Mersenne corresponded throughout his life, Mersenne explained that Galileo's condemnation resulted from a promise he had made in 1622 not to teach the Copernican theory, which conflicted with the Scriptures. Mersenne quotes from Ecclesiastes that "the Earth forever stands."³² The Church, he says, must ensure that everyone does not interpret Scripture according to his own fantasy. He admits that there are other passages of Scripture which imply that the Earth moves, such as the

²⁹Descartes à Mersenne, 14 août 1634, no. 370, Ibid., 298-99.

³⁰Oeuvres et lettres ("Bibliothèque de la Pléiade"; Paris: Gallimard, 1953), pp. 154-63.

³¹Ibid., p. 678.

³²Eccl. I:4.

statement in Psalms that "the Earth trembles before the face of the Lord."³³ While Scripture is occasionally accommodated to our senses, it is often necessary to interpret it in a strictly literal sense. We need to be guided by the Church in our interpretation.³⁴ This was the same position which Mersenne had adopted earlier in his examination of the Copernican theory.³⁵ Despite this often repeated attitude, however, he, in fact, gave a good deal of support to Galileo.

In 1634 Mersenne published five books, four of which dealt with current problems of science and religion, some of which he had been considering in his correspondence. The fifth was a translation of a manuscript of Galileo's on mechanics, which had not yet been published. It was a much earlier work written by Galileo about 1597.³⁶ This was the manuscript circulated in Paris after Diodati's return from Rome in 1627. Mersenne may have decided to publish it at this time because he was interested in mechanical problems, which he had been discussing in letters

³³Psalms, CXIII:7.

³⁴Mersenne à André Rivet, 8 février 1634, no. 311, Correspondance, op. cit., 37-38.

³⁵See Chapter III above.

³⁶See the Note by DeWaard in Mersenne, Correspondance, op. cit., p. 76.



to his friends, and also because he wanted to encourage Galileo not to abandon his writing. The book is written, he says, by "that excellent man who is one of the most subtle minds of this century."³⁷ He concludes the "Dedication" to the book with the hope that Galileo will make public all his ideas, now that he has time and leisure since his condemnation and banishment, and that, although he is a septuagenarian, he will still feel inclined to finish his work.³⁸

Of the other four books published in 1634, three contain some comment on the theory that the Earth moves. Question XI of Questions Inouyes, for example, asks whether the Earth turns on its axle every twenty-four hours and makes a circuit of the Sun each year. His answer to this is that we cannot know whether the Earth moves or not. We could just as well explain all the phenomena which have appeared up to the present by the movement of the Earth as we could by that of the stars. It is easier, however, Mersenne believed, to maintain that the Earth turns on its axle rather than that the stars move, if God chose the

³⁷Les Mechaniques de Galilée, mathématicien et ingénieur du Duc de Florence. Avec plusieurs additions rares, et nouvelles, utiles aux architectes, ingénieurs, fonteniers, philosophes, et artisans (Paris: Jacques Guénon, 1634), p. a.

³⁸Ibid.

simplest way to arrange all the parts of the universe.³⁹

He repeats this point in another of the books published in 1634. There is a beautiful order in the arrangement of the planets, with the time of their circuit of the Earth increasing according to their size; for example, the Moon takes 29 days, Mercury 80 days, Venus nine months, the Sun one year, Mars two years, Jupiter twelve years, and Saturn thirty years. The stars, therefore, ought to be motionless, and the Earth rotate on its axle once every 24 hours. He did not think it possible for the stars to travel 644,848 leagues per minute, when the Earth could move only 1/16 of a league per minute. Thus, for the Earth to rotate on its axis would be the simplest arrangement for God to choose. But, says Mersenne, neither science nor revelation shows us how God has regulated the movements of the universe, for although he does nothing superfluous, he could have significant reasons for making the stars revolve rather than the Earth. We must, therefore, suspend our judgment on this point.⁴⁰

One of the books published in 1634 was entitled

³⁹Questions inouyes ou recreation des scavans. Qui contiennent beaucoup de choses concernant la theorie, la philosophie et les mathematiques (Paris: Jacques Villery, 1634), pp. 43-44.

⁴⁰Questions harmoniques, dans lesquelles sont contenues plusieurs choses remarquables pour la physique, pour la morale, et pour les autres sciences (Paris: Jacques Villery, 1634), pp. ii-vii.

Les Questions théologiques, although most of them were on scientific topics. In this book, Mersenne's admiration for Galileo, despite the condemnation, is fully evident. Once again, and in more detail, he discusses whether it is permissible to teach that the Earth moves. Again his answer is that, although it is the shortest and easiest way of explaining the world system, this does not constitute a proof. It is possible to imagine that at some time in the future a proof of the opposite view will be given. Thus we are reduced to the necessity of following the Church's lead on this point.⁴¹

He implies that the Scriptures cannot help us decide on questions like the above, since, as the Word of God, they ought to be explained by the laws of nature, which is the Work of God. The Scriptures are consequently interpreted in different ways, depending on the individual's understanding of nature. Some believe that they speak of the stability and immobility of the Earth. Others, that the Scriptural passages can be explained only by the movement of the Earth. For example, when Joshua commanded the Sun to stand still in the heavens, the Sun stopped rotating on its axis, which in turn caused the Earth to stop revolving around it. Therefore, says Mersenne, interpretations

⁴¹Les Questions théologiques, physiques, morales, et mathématiques. Où chacun trouvera du contentement, ou de l'exercice (Paris: Henry Guénon, 1634), p. 211.

of Scripture ought to conform to the Church ordinances, and each philosopher should not be allowed to develop his own interpretation.⁴²

There are those who think that a proof of the Earth's motion will soon be available. If so, they need have no fear that what has been condemned will be retracted. The Church, which has not yet assembled a Council to discuss this question, will, assures Mersenne, be wise enough to deal with it when the time comes.⁴³

In the meantime, Mersenne considers Galileo's obedience to the prelates of the Church very commendable as the action of a good Catholic. It is, moreover, possible to continue using the Copernican method to calculate eclipses and to locate planets, since this offends neither Scripture nor the judgment of the cardinals. If scholars proceed in science with discretion and judgment, concludes Mersenne, they will not be censured, and will have no reason to complain or retract.⁴⁴

This last statement is interesting in that Mersenne himself retracted in this book. Questions théologiques exists in two different versions. The first version contains question 34, which gives the reasons we have for suggesting that the Earth rotates on its axis every twenty-four hours,

⁴²Ibid., pp. 212-13.

⁴³Ibid., p. 213.

⁴⁴Ibid., p. 214.

and questions 44 and 45, which summarize some of the significant points in the first two dialogues in Galileo's book. In the second version of this book, these topics have been removed and more innocuous subjects discussed in their place. Question 34 is now devoted to the discussion of a new science of sound, and question 44 considers how much power the voice would need to carry from the Earth to the Firmament. In question 45 the comments based on the second dialogue in Galileo's book have been omitted, and we find only a discussion of whether it is permissible to support the idea that the Earth is mobile, accompanied by a copy of the censure against Galileo.

Mersenne sent both the unexpurgated and the expurgated versions to Peiresc, with instructions that the latter should be sent to his friend Doni in Rome. His explanation for making the change was that there had been some adverse comment among the Doctors of the Sorbonne, because in the original version he had listed the reasons for believing that the Earth moved, without refuting them. He had, therefore, thought it prudent to remove all the questions which could possibly give offense, and to put others in their place which would make the second version more suitable for someone in Rome.⁴⁵

Among the reasons which he gives in the unexpurgated

⁴⁵Mersenne à Peiresc, 28 juillet 1634, no. 364, Correspondance, op. cit., IV:267-68.

version for believing that the Earth can be said to rotate on its axle are the following: (1) In the whole great machine of the universe, the Earth would have to move less than the stars; (2) The order of nature seems better established if the smaller planets move faster than the larger ones. This theory he attributes to Galileo; (3) Since the Earth needs the Sun, it ought to seek it, as man seeks the fire he needs when he is cold; (4) The movement of the Earth explains all phenomena more clearly and more simply. A cannon ball travels as far when it is fired toward the East as it does when it is fired toward the West, even though the Earth is rotating toward the East, because the ball is carried by the same movement as the Earth. An object dropped from a tower would fall just as perpendicularly to the foot of the tower if the Earth were moving as it would if the Earth were at rest.⁴⁶

Nevertheless Mersenne admits that these cannot be considered proofs of the mobility of the Earth. That this would provide a simpler explanation of things is no proof, for God does not always act in the simplest and easiest way. This is evident if we examine the possibility of salvation and the state of Grace. The simplest way to save everyone would be by a single act of God's will. Instead,

⁴⁶Les Questions théologiques, physiques, morales, et mathématiques. Où chacun trouvera du contentement, ou de l'exercice, op. cit., pp. 158-63.

He leaves it to our individual wills. If He does not act in the most direct way in dealing with Grace, why should we suppose that He does so in establishing the order of nature?⁴⁷

Question 44 summarizes the "most notable" ideas in the first dialogue of Galileo's book, supporting the movement of the Earth. He attacks, for example, the Aristotelian idea that the heavens are incorruptible. Had Aristotle seen the new stars of 1572 and 1604, Galileo alleged, he would have changed his mind, especially if he had observed that comets were as high as the Sun.⁴⁸

Mersenne summarizes in question 45 some of the points in the second dialogue of Galileo's book. The basic idea here is that the phenomena we observe can be explained more easily if the Earth rotates on its axis than if the stars revolve around the Earth. Also mentioned here is the orderly arrangement of the planets by which the smallest moves the most rapidly, and the largest the most slowly. Hence the stars, being the largest of all, ought to move at the slowest rate, or not at all. Again Mersenne points out that although some think that nature moves in the simplest way possible, God could, nevertheless, have ordained it otherwise had he wished.⁴⁹

⁴⁷Ibid., pp. 164-65.

⁴⁸Ibid., p. 204.

⁴⁹Ibid., pp. 210-13.

Mersenne concludes by saying that there are many other points in these dialogues, as in dialogues three and four, that he could discuss. He is saving them, however, for an entire book.⁵⁰

Mersenne was anxious to defend Galileo's book against its detractors. He therefore asked Peiresc to send him any books which had been written against Galileo, so that he might refute them. He added that Peiresc need have no fear of what he would say, since he would base all his statements on experiments.⁵¹

Peiresc replied that he was happy that Mersenne was going to defend Galileo by means of experiments, but he recommended the exercise of moderation and restraint in refuting those with contrary views. He also suggested that Mersenne have his writing examined in advance to forestall the possibility of later censure and reproach.⁵² Peiresc's own attitude toward Galileo's book can be found in a letter to someone who had asked his opinion of the Copernican theory. He replied that there was nothing clearer than Galileo's book, and that it was easy to find oneself

⁵⁰Ibid., p. 214.

⁵¹Mersenne à Peiresc, 4 décembre 1634, no. 393, Correspondance, op. cit., p. 404.

⁵²Peiresc à Mersenne, 19 décembre 1634, no. 394, Ibid., 417.

persuaded by it.⁵³

Descartes expressed surprise that Mersenne should want to refute books attacking the idea of the motion of the Earth.⁵⁴

Shortly after this, however, Mersenne changed his mind. He had received several books contradicting Galileo, but had decided that they were not worthy of being mentioned in connection with so great a man. This was not only Mersenne's opinion, but also that of his friends, to whom he had given the books for their evaluation.⁵⁵

Having decided not to waste time refuting the books of Galileo's critics, Mersenne decided also against devoting an entire book to a summary of Galileo's ideas. One reason for this may well have been that a Latin translation had been published in 1635.⁵⁶ He probably felt that such a summary was therefore no longer needed.

He did, however, include a brief account of some of the ideas in the other dialogues in L'Harmonie universelle, the great work on music which he published in 1636-37.

⁵³Peiresc à Gilles de Loches, 4 novembre 1636, no. 572, Ibid., VI:144.

⁵⁴Descartes à Mersenne, mars 1635, no. 418, Ibid., V:127.

⁵⁵Mersenne à Peiresc, 25 mai 1635, no. 436, Ibid., 214.

⁵⁶Mersenne à Peiresc, 1^{er} juillet 1635, no. 453, Ibid., 270.

He had been working on this book for ten years, and had already published several others dealing with various aspects of harmony.⁵⁷ This is the only book of Mersenne's which has been republished. Its major significance lies in the discussion of the musical instruments available in the 17th century and in its analysis of ancient and contemporary forms of music. Much of his correspondence was devoted to gathering material for the book from sources all over Europe.

One section of the work deals with motion and includes comments on problems relating to material in Galileo's book. Since a body dropped from the top of a tower will fall at the foot of the tower whether the Earth is moving or not, we cannot, therefore, prove by this means that the Earth is not moving. In the same way a cannon ball dropped from the mast of a ship will fall at the foot of the mast, whether the ship is moving or not.⁵⁸

It is in this book that Mersenne begins to express disagreement with some of Galileo's ideas. Mersenne's conclusions were based on experiments, some of which he had

⁵⁷Mersenne à Peiresc, 20 mars 1634, no. 324, Ibid., IV:81.

⁵⁸Harmonie universelle contenant la théorie et la pratique de la musique, où il est traité de la nature des sons et des mouvemens, des consonances, des dissonances, des genres, des modes, de la composition, de la voix, des chants, et de toutes sortes d'instrumens harmoniques (2 vols.; Paris: Sebastien Cramoisy, 1636-37), pp. 150-54.

repeated more than thirty times, others more than one hundred times. Since Peiresc had been cautioning Mersenne about being critical of others in his writings,⁵⁹ and also since Peiresc was subsidizing the publication of L'Harmonie universelle, Mersenne sent him the page proofs of the book as it came off the press. No one else had yet seen it, so that if Peiresc found any comment too harsh, Mersenne would willingly revise it or remove it entirely if necessary.⁶⁰ Peiresc replied that he would like to see those statements disagreeing with Galileo's ideas expressed in the form of mild propositions, rather than of contradiction or of refutation.⁶¹

Mersenne was so interested in Galileo's work that he made a special effort to discover when Galileo's last book, the Discorsi e dimostrazioni matematiche, intorno a due nuove scienze, was being published.⁶² In 1639, the year after its appearance, Mersenne published a French paraphrase of the book. He thought that it would delight

⁵⁹Peiresc à Mersenne, 3 juillet 1635, no. 454, Correspondance, op. cit., V:278; 23 juillet 1635, no. 466, Ibid., 332; 20 août 1635, no. 472, Ibid., 355.

⁶⁰Mersenne à Peiresc, 17 septembre 1635, no. 484, Ibid., 405; 17 novembre 1635, no. 510, Ibid., 480.

⁶¹Peiresc à Mersenne, 2 décembre 1635, no. 520, Ibid., 520.

⁶²Bonaventure et Abraham Elsevier à Mersenne, 8 mars 1638, no. 657, Ibid., VII:106.

all who were interested in science since it was filled with observations and proofs, although all of the necessary figures could not be included because of their great number. Nevertheless, there were enough of them to give the most scholarly readers "reason to admire the excellent mind of Galileo."⁶³

It is quickly apparent from the volumes of Mersenne's Correspondance that he was becoming increasingly interested in mathematical developments in science. This interest was aided and encouraged by his friends, with whom he organized a mathematical society in Paris in 1635, and with whom he engaged in long discussions of mathematical points contained in Galileo's books.⁶⁴ The last three books published during Mersenne's lifetime and the one posthumous publication are predominantly mathematical in nature.⁶⁵

⁶³Les nouvelles pensées de Galilée, mathématicien et ingénieur du Duc de Florence. Où il est traité de la proportion des mouvemens naturels, et violents, et de tout ce qu'il y a de plus subtil dans les mécaniques et dans la physique. Où l'on verra d'admirables inventions, et démonstrations, inconnues jusqu'à présent (Paris: Henry Guénon, 1639), p. aiiij.

⁶⁴For references to the mathematical society, see the Introduction above.

⁶⁵Universae geometriae mixtaeque mathematicae synopsis et bini refractionum demonstratarum tractatus studio et opera (Paris: Antonium Bertier, 1644); Cogitata physico mathematica, in quibus tam naturae quam artis effectus admirandi certissimis demonstrationibus explicantur (Paris: Antonium Bertier, 1644); Novarum observationum

The explanation for this emphasis on mathematics is to be found in his 1634 books, in which he indicates that he has abandoned the Aristotelian orientation with which he began in 1623, and that he has adopted a new approach. Twenty or thirty years after finishing a course in Philosophy and Theology, he says, we can end up by doubting everything. If we are still following Aristotle's definition of Physics as the science of eternal and immutable truths, then we must conclude that we know nothing.⁶⁶ We can see only the outward appearance and surface of natural objects without the ability to penetrate beyond. Thus we can have no science other than that based on the external effects, since we are unable to know the causes.⁶⁷

We cannot know with certainty the real causes of what happens in nature, for there is always some doubt as to whether the causes we imagine are true.⁶⁸ Since we do not even know the reasons for those things which are close to us and which we see clearly, how much less are we able to know the causes of things which are remote and less immediately obvious. Nothing, for example, is more certain

physico-mathematicarum tomus III (Paris: Antonium Bertier, 1647); L'Optique et la catoptrique du Réverend Père Mersenne Minime. Nouvellement mise en lumière après la mort de l'auteur (Paris: F. Langlois, 1651).

⁶⁶Questions inouyes ou recreation des scavans, op. cit., pp. 69-71; Les questions théologiques, physiques, morales, et mathematiques, op. cit., p. 9.

⁶⁷Ibid., p. 11.

⁶⁸Ibid., p. 19.

than that stones, when dropped, fall toward the Earth, and yet we do not know why. How then can we know with certainty about the movement of the planets? Some say that all bodies, including the Earth and the Stars, are only appearances.⁶⁹ How can we answer them? There is no opinion so absurd that several arguments cannot be found to justify it. For we know nothing with certainty unless we can prove all other opinions about it to be false.⁷⁰

It would seem, then, as though Mersenne, having abandoned Aristotle, had arrived at scepticism. This is not quite the case, however, since he finds two things which he believes give us some sort of certainty.

While the senses often err, as experience with optics shows, we can, nevertheless, correct the errors of sense impressions by the use of reason and by observation and experiment.⁷¹ Mersenne himself had relied heavily on experiments, in examining problems in mechanics suggested by a study of Galileo. Although we may never know the true causes of things, we can observe the regularities in

⁶⁹ Questions inouyes ou récréation des sçavans,
op. cit., p. 71.

⁷⁰ Ibid., p. 93.

⁷¹ Questions harmoniques, op. cit., pp. 198, 217.

the motions of the phenomena.⁷² Even artisans might be helpful by giving us their knowledge gained from experience and observation.⁷³ The same is true of alchemists. Although we do not know whether their theory that everything is made from salt, sulfur and mercury is correct, we can learn from them, provided they report their observations and experiments accurately.⁷⁴

The only way in which we can penetrate the surface of corporeal things is through the use of mathematical relationships. The attempts made by the ancient philosophers to deal with qualities were unsatisfactory, says Mersenne, since no proof could be given of their causes. Instead, we are restricted in the physical world to numbers, lines, figures and weight, which can be dealt with mathematically.⁷⁵ Mathematics is the universal factor in physics, and serves as the foundation for reason.⁷⁶ Mersenne uses the following illustration to demonstrate the usefulness of mathematics. Small animals falling from a height are hurt less

⁷²Les questions théologiques, physiques, morales, et mathématiques, op. cit., p. 19.

⁷³Ibid., p. 183.

⁷⁴Questions inouyes ou récréation des scavans, op. cit., p. 123.

⁷⁵Les questions théologiques, physiques, morales, et mathématiques, op. cit., p. ai.

⁷⁶Questions inouyes ou récréation des scavans, op. cit., p. 132.

than larger ones because, since the ratio of their weight to their surface area is less, they fall less rapidly, being buoyed up more by the resistance of the air. This also explains, he says, why a heavy weight can be thrown farther than a light one, or why a large sail makes a ship go faster than a small one.⁷⁷

Mersenne thus became part of the new trend which shifted the emphasis away from a qualitative to a quantitative science. He had refused to abandon Aristotelianism for any of those attempts to replace it which had emphasized the causes of phenomena by postulating hidden powers in nature. Instead, he found the key to science in a mathematical approach, which avoided any risk of conflict with religion. By 1634, then, he had become a strong and enthusiastic supporter of Galileo, undoubtedly the most outstanding scientist of the period, and had at last found the new science which he had been seeking.

⁷⁷Ibid., p. 131.

CHAPTER VIII

CONCLUSION

During the early 17th century discontent with Aristotelian science was reaching a climax. This dissatisfaction had, in fact, become so widespread that it has been described as a "crisis".

During the Middle Ages science and religion fitted together very well. When the Aristotelian corpus was discovered in its entirety, it was so impressive and dealt with so many areas of thought, that after some hesitation it was adopted as a basis for understanding the world. The hesitation had been caused by the few ideas of Aristotle's which were considered incompatible with Christianity. When these had been rejected or modified, the scientific view of the world and man's place in it combined with the religious view to form a tidy synthesis. Religion was felt by some to be so closely bound up with Aristotelianism, that an attack on the latter was considered tantamount to an attack on the former.

By the 16th century Scholasticism was being strongly criticized in some quarters, and alternative scientific

views were being proposed. Because science and religion were so closely interrelated, this meant that questions were being raised about the hitherto accepted religious view of the world.

Marin Mersenne seemed to have been aware of this problem from an early age and was well equipped to deal with it. His education at La Flèche, one of the newest and most outstanding schools of the day, gave him a thorough grounding in Aristotelian thought. Nevertheless, the Jesuits themselves were not wholeheartedly committed to Aristotle or to St. Thomas and hoped to establish their own philosophy and theology. This attitude must have made itself felt to Mersenne, for this was exactly his approach to scientific problems in his early works. Although Aristotle was for the time being the best available, it was possible for him to be superseded in the future.

After joining the Minime Order, Mersenne finally settled in Paris, one of the leading intellectual centers of all Europe, in the convent near the royal court at Place Royale, at a time when the court was the hub of much of the cultural activity of France. There Mersenne met many who were interested in scientific developments, and became a member of many of the intellectual groups. He was an avid letter-writer and entered into correspondence with those who had contributions to make in science. He encouraged them to write down their ideas and to answer

questions about a variety of subjects which he found of interest.

Mersenne was always a prodigious worker, as can be seen from the size of the books that he wrote. His first great work, Quaestiones celeberrimae in Genesim, was undertaken in an attempt to meet the questioning in science by writing a commentary on the book in the Bible which was most directly concerned with a description of the natural world. In the light of the certainty of Scripture, Mersenne attempted to analyze man's knowledge in almost every field, so that he might know what was valid and what was questionable.

Quaestiones celeberrimae in Genesim is divided into three parts, which deal with the various scientific interpretations being proposed as alternatives to a crumbling Aristotelianism. Approximately the first third of the book deals with Italian Naturalism. This was an attempt to discard the medieval synthesis and to return to the original Aristotle, thereby eliminating the modifications undertaken to make Aristotelianism more acceptable to Christianity. This, of course, Mersenne could not accept.

The ideas of the leading exponent of this school, Pietro Pomponazzi, were being disseminated in France by Julius Caesar Vanini. They attempted to explain certain marvellous events by supposing occult natural powers. Mersenne took this to be an attempt to explain away

Christian miracles by giving naturalistic explanations for them. In order to defend religion, therefore, Mersenne emphasized the difference between the natural and the supernatural. Christian miracles, he said, were true miracles and needed no other explanation than the will of God. Other so-called miracles, such as the marvellous events reported by pagan writers or attributed to pagan religions, were false.

Mersenne made use of his knowledge of science, especially optics, in examining the naturalistic explanations which had been offered for miracles, and attempted to demonstrate that these "explanations" were just not adequate to explain the event. By dismissing the credibility of reports of seemingly marvellous occurrences, Mersenne absolved science from the necessity of relying on explanations based on supposed occult powers in nature. Italian Naturalism, he concluded, was not a satisfactory alternative to Aristotelianism, because it tried to eliminate what he considered a valid religious concept, that of the miracle, and at the same time filled the universe with unlikely hidden powers.

In the last third of Quaestiones celeberrimae in Genesim, Mersenne examined another alternative approach to science being advocated at the time, which likewise had religious implications. In the work of Giorgio Veneti, Mersenne encountered the attempt to build science on a

foundation of Hermeticism and Cabalism. This view also tried to explain the world by supposing various natural powers, located primarily in the heavens and attached to the heavenly bodies, the stars and the planets. According to this view, man could unlock the powers of nature and make them do his bidding, if he could learn to decipher the secrets hidden in Hermetic and Cabalistic writings and in the Cabalistic interpretations of the Bible.

Here again Mersenne rejected the authenticity of the writings and the reliability of their authors. These books were not written, he maintained, by those to whom they were attributed. He rejected also any attempt to interpret the Bible as a secret document of scientific knowledge. In contrast to the Cabalists' tendency to explain everything metaphorically, he insisted that the Bible be interpreted much more literally in order to preserve its religious purpose.

He rejected the theory that there were powers or intelligences in the heavens which could be made to do man's bidding. To him this was simply a kind of demonology. The number magic, talismans, musical chords and other devices which were supposed to influence these natural powers by sympathetic magic, had been shown by experience, Mersenne insisted, to be inoperative. This kind of science he would have nothing to do with other than to attack its validity as an explanation of natural phenomena and to criticize its

unorthodox religious ideas.

The middle part of Quaestiones celeberrimae in Genesim is more in line with a traditional Biblical commentary. Added to it, however, are long digressions on current scientific and religious explanations of the world.

In order to show the relationship between the Biblical explanation of things and man's knowledge, he discussed the various ways in which the Bible could be interpreted. Because of the Cabalistic attempts to read too much into Scripture by giving too metaphorical an interpretation, he emphasized the importance of a literal interpretation. He was also aware of the possibility of applying the theory of accommodation to those passages which seemed to conflict with scientific ideas.

Although progress had been made in various branches of science, such as magnetism and optics, the area in which the old Aristotelian system had been most directly attacked was that of astronomy. The assumption that the Earth was in the center of the universe, which the Copernican hypothesis had attacked, was so basic, that the Church had felt its ideas to be challenged. It had answered by condemning the idea. Although Copernicanism had not been declared a heresy, Merseune was willing to accept the decree of the College of Cardinals of 1616, as long as no convincing proof of the Copernican heliocentric system could be

discovered. He likewise believed, however, that the Aristotelian geocentric theory could not be definitely proved either. And therefore, since scientific reasoning could not give us the true picture beyond the shadow of a doubt, he was willing to abide by the Church decree.

One result of upsetting an established and almost universally accepted world view had been to cause some to question the validity of any of man's knowledge. At the end of the 16th and at the beginning of the 17th centuries scepticism was being revived and advocated by some as the only answer in a world where conflicting religious views led to war, and where commonly accepted opinions turned out to be unreliable. Mersenne was aware of this trend and was himself influenced by it. One answer to the charge that everything changes and that there is no stability was to appeal to experience.

The Alchemists had an answer for the sceptics which was supposedly based on experiment and observation. Yet the theories they advanced were unacceptable to Mersenne, who felt that the experiments performed by them did not support their theories. He was interested, however, in the results of these experiments, provided they were accurately reported.

Mersenne was also critical of those Alchemists who insisted that certain religious concepts were simply secret ways of explaining alchemical theories and processes.

Nor was the Alchemists' reliance on weight and measure completely satisfactory in Mersenne's eyes. In this they failed to take into account, as did all extreme empiricists, such as Francis Bacon, that the natural light of reason was also necessary to develop valid scientific theories.

The Sceptics insisted that we know nothing, that we see only the surface of things and do not know either their essences or their causes. The second half of this contention Mersenne did not refute, and for this reason he has been called either a positivist or a mitigated sceptic by recent scholars. He did not conclude, however, that science is therefore impossible. At least we know the surface of things and their effects, and this is enough of a foundation, he thought, on which to build a science. As far as metaphysics is concerned, we know that there is something and not nothing, and as far as physics is concerned, that there are bodies in motion, quantities that can be dealt with by the senses, and light. We know these facts to be true, even though there may be many theories to explain them.

At this point Mersenne was still seeking the kind of science which could be built on this foundation. Since he had not yet found it, he was still clinging to Aristotle. Although he knew that there were many weaknesses in Aristotelian science, he still felt that it was the best available.

He definitely preferred Aristotelianism to the system of Robert Fludd in England. Fludd was the one person whose ideas Mersenne criticized vigorously in print, who refused to become reconciled to him. Their controversy continued throughout Fludd's lifetime.

The foundation of the latter's science was a symbolic analogy between the universe and musical harmony. Fitted into this overall system were various natural powers to which Fludd attributed many of the phenomena, such as palmistry, which Mersenne rejected. Mersenne preferred Kepler's use of mathematical relationships and mathematical proportions. He had put Fludd's theories about palmistry to the test by publishing the prints of two hands to see how Fludd could analyze them. The results of the "experiment" were unsatisfactory, from Mersenne's point of view, for Fludd somehow discovered that they were the hands of Gassendi.

By the 1630's Mersenne seems to have found in the work of Galileo the new approach to science that he had been seeking. Galileo had written a great deal about mechanics as well as astronomy. Mersenne was very interested in both. By the time he became completely immersed in the work of Galileo, he had become convinced of the value of mathematics and its application to physics. Here was his answer to the quest for a new science. Even if man is limited, as the sceptics maintained, to a knowledge

of the surface of things, and to the known effects of unknown causes, he can nevertheless discover in them a mathematical regularity on which science can be built. Quantitative relationships among phenomena can be discovered and expressed in mathematical proportions. Observation and experiment are used to determine what these relationships may be. Here at last was a science which could stand alone, without constituting a threat to religion, which other attempts to find a new science had failed to do.

The major conflict between this view and religion was believed to center on the Copernican theory. Mersenne, however, found no real basis for conflict. His frequently reiterated statements that man had no way of proving the truth of the Copernican hypothesis were not, as they might at times have seemed, mere rationalizations to avoid offending the Church. By 1634 Mersenne had finally discarded the Aristotelian idea that the purpose of science was to reveal eternal truths, and had concluded that science, in dealing with phenomena, was making no statement about metaphysical truth. Since there was no way, therefore, to decide whether the geocentric or the heliocentric theory was true in any absolute sense, the Church had no cause to worry about the work of the scientist, who could proceed with confidence, as Mersenne himself did, trying to work out the mathematical relationships of phenomena. He had, in fact, resolved

to his own satisfaction the problem of replacing the Aristotelian science with one that would in no way offer a threat to religion.

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