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WILLIAM HARVEY AND THE SCHOLASTIC TRADITION*

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So many learned men have delivered orations on William Harvey that there is clearly little fresh in fact or opinion which can be said. I was to some extent encouraged to accept the task of delivering the oration this year, so generously conferred on me, because I knew that I could not be expected to propound any new views on Harvey's life, character, or achievements. My function would rather be the less ambitious one of suggesting a theme which would provide the occasion for our paying tribute once again to our great progenitor.

The compulsion imposed on a Harveian orator of living over a considerable period in close touch with the mind of his subject brings with it some pleasing and rewarding experiences. Among these I have personally most enjoyed the opportunity of living, as it were vicariously, through one of the momentous periods in the history of knowledge—that period, namely, when the human spirit had begun, at first painfully and then more confidently, to shake off the fetters of scholastic rule. Harvey is a grand exemplar as well as a grand companion with whom to re-live these fateful days, for he reveals for us in his writings so clearly the thoughts and beliefs, and withal the confusing intellectual loyalties, that then swayed the minds of men.

To understand Harvey's outlook and achievements we must remind ourselves that he was surrounded by those fertilizing influences on human thought which had their great flowering in the aesthetic and literary renaissance, first in Italy and then in Northern Europe, and which, during his own early life, had culminated in our Shakespeare. The same influences were abroad in science and philosophy, and it is no coincidence that Descartes, the founder of modern philosophy, Galileo, one of the great architects of modern science, and Harvey, the founder of experimental medicine, were contemporaries.

The Spirit of the Schools

At the same time we are constantly reminded by a study of the works of these great innovators that the spirit of the schools was still heavy upon them. We remember that Harvey was a student at Padua from

1598† to 1602, and that from that stronghold of Aristotelianism he carried back to England much of the outlook of Aristotle. Indeed, his biggest work, that on generation, is largely a treatise in the manner of the great philosopher. The text is based upon a similar text written by Aristotle 1,900 years before, the conclusions are largely a confirmation or modification of Aristotle's views, and the whole work is inspired by the veneration in which Harvey clearly held his master. In one place he exclaims: "Foremost amongst all the ancients I follow Aristotle; among the moderns, Fabricius of Aquapendente; the former as my leader, the latter as my informant by the way."‡ Fabricius, also a good Aristotelian, was Harvey's teacher at Padua. At another place he says: "The ancient philosophers . . . by their unwearied labour and variety of experiments, searching into the nature of things, have left us no doubtful light to guide us in our studies. In this way it is that almost everything we yet possess of credit to philosophy has been transmitted to us through the industry of ancient Greece."

It is of interest to place beside these remarks of Harvey the opinion of those who ascribe the intellectual thralldom of the Dark Ages to the teaching of the Greek philosophers. Bertrand Russell, in a reference to a statement of Aristotle, says: "This, like everything else that Aristotle said on scientific subjects, proved an obstacle to progress" (*History of Western Philosophy*, p. 551, Allen and Unwin, London, 1947). A great historian (H. A. L. Fisher), in a reference to the seventeenth century, says: "The centre of intellectual interest had changed. The prophetic genius of Francis Bacon was inviting the student to abandon Aristotle and the Scholastics and to turn to the obedient study of nature. Not by *a priori* reason but by induction were the secrets of the world to be unlocked" (*A History of Europe*, p. 641, Edward Arnold, London, 1938).

Francis Bacon has a special interest for the student of Harvey, as, according to Aubrey, Bacon and Harvey were known to one another, probably intimately, in their mutual relationship as patient and medical attendant. According to Aubrey, Harvey, "speaking in derision," said that Bacon "wrote philosophy like a Lord Chancellor." Whether this innuendo reflects the fundamental conflict in their respective philosophies we cannot say.

*The oration delivered at the 156th Harveian Festival in Edinburgh on June 1, 1951.

†D'Arcy Power in his *Life of Harvey* gives 1598 as the date when Harvey went to Padua. Herbert Spencer in his *Harveian Oration* (London, 1921) states that Harvey's name first appeared on the roll of Padua University in 1600, and he quotes Venn as stating in his *Annals of Caius and Gonville College* that Harvey was a scholar in that college till Lady Day, 1600.

‡This and subsequent quotations are from the *Works of William Harvey, M.D.*, translated from the Latin by Robert Willis and printed for the Sydenham Society, London, 1847.

Aubrey is not always reliable. Moreover, Harvey, in his twenty-fifth exercise, uses words which suggest that he did not despise the Baconian method. These come after his discussion on the development of the chick. This, he says, may have appeared too lengthy "to those who do not see the end and object of such painstaking, of such careful observation. Wherefore I think it advisable here to state what fruits may follow our industry, and in the words of the learned Lord Verulam, to 'enter upon our second vintage.'" On the other hand, Bacon does not mention Harvey in his published works. It is true that Bacon died (in 1626) before the appearance of Harvey's book on the circulation (1628), but it is difficult to believe that he had not learnt something of the important discovery during the many years in which Harvey was lecturing on it in London prior to its actual publication.

Attitude to Aristotle

In Bacon's own works we have clear evidence that in his attitude to Aristotle the difference between the two men was profound. In the *Novum Organum* Bacon says: "In the physics of Aristotle you hear hardly anything but the words of logic. . . . Nor let any weight be given to the fact, that in his book on animals and his problems, and other of his treatises, there is frequent dealing with experiments. For he had come to his conclusion before; he did not consult experience, as he should have done, in order to the framing of his decisions and axioms; but having first determined the question according to his will, he then resorts to experience, and bending her into conformity with his placets leads her about like a captive in a procession; so that even on this count he is more guilty than his modern followers, the schoolmen, who have abandoned experience altogether" (*The Philosophical Works of Francis Bacon*, p. 271. George Routledge, London, 1905).

We know that Harvey's whole outlook was in direct opposition to this view on Aristotle. Almost every page of his works, especially of the *De Generatione*, is to us a vindication of the philosopher. It would seem to be equally clear that Harvey was unconscious of any need to protect the good name of the Stagirite, and this encourages us in the belief that if he had knowledge of Bacon's hostility he did not regard it as worthy of active refutation. For we know that Harvey was not averse from active controversy where his convictions were assailed. At the same time he was sufficiently of his age to realize that the battle against blind subservience to authority had already been engaged. "When," he says, "we acquiesce in the discovery of the ancients, and believe . . . that nothing farther remains to be known, we suffer the edge of our ingenuity to be taken off, and the lamp which they delivered to us to be extinguished." And elsewhere he exclaims: "The method of investigating truth commonly pursued at this time therefore is to be held as erroneous and almost foolish. . . . We have frequently mere verisimilitudes handed down to us instead of positive truths." To Harvey the fault is not with Aristotle but with those for whom all knowledge was contained in the books of the sages written many centuries before or in the speculative inventions to which these books had given birth. As Ernest Barker remarks: "The Middle Ages inherited the Peripatetic Cult of the 'master'; they 'made his torch,' as Dryden said, 'their universal light'; and thus the beginning of modern science in the sixteenth century took the form of a revolt against Aristotle—one of the most scientific spirits that

ever lived. The life of Aristotle after his death has many of the elements of tragedy" (*Encyclopaedia Britannica*, 14th ed., p. 353, London, 1929).

In his passionate advocacy of the direct approach to Nature and his wholesale condemnation of those who trafficked in "mere verisimilitudes" Harvey showed at once his hostility to the schoolmen and his plea for a return to the method of Aristotle. In this he had powerful company in René Descartes, the most outstanding of his early converts. In his *Discours de la Méthode* Descartes says of the pseudo-followers of Aristotle: "I am sure that those who most passionately follow Aristotle nowadays would think themselves happy if they had as much knowledge of nature as he had, even if this were on the condition that they should never attain to any more. They are like the ivy that never tries to mount above the trees which give it support, and which often descends again after it has reached their summit" (*The Philosophical Works of Descartes*, Vol. 1, p. 125, Cambridge University Press, 1911).

Work on Generation

It was by one of the great chances in the history of science that Harvey went to Padua in 1598 and there found Fabricius, a great anatomist, who was interested in the problems of the heart and blood vessels. After he left Padua in 1602 and during the following years, by patient and direct study in man and animals, apart from a lingering residue in the shape of the vital and animal spirits and the innate heat, which he took over from his predecessors, Harvey established the major facts in regard to the circulation. His book was not published till 1628. His largest work, with which I propose to deal more especially to-day, is the *De Generatione Animalium*. This was not published till 1651, when he was 73 years old. To this work Harvey devoted a great part of his life, for he already refers to it in his *De Motu*, published twenty-three years before. It is clear that he expended on it his great talents and his great energy. It contains a vast accumulation of observations, more particularly on the development of the chick. But in addition it refers to studies carried out on the generation of other animals, and it has been estimated that altogether over eighty different species were investigated. In the book Harvey refers to an extensive work on the generation of insects to which he attached great importance but which was lost when his house was attacked and his belongings were destroyed during the Civil War.

To the work on generation Harvey applied the same method of "controlled experiment" as he had employed in his study of the circulation. In the latter work the method was triumphant. The *De Motu* introduced a new era in the history of science. On the other hand, whilst in the study of generation many interesting facts and some facts of lasting importance were revealed, in general the permanent value of this work has been small. The chief reason is that for the study of the essential data Harvey was without the technical assistance necessary, more especially the microscope.

Harvey's Outlook

We know Harvey as a great innovator. But to appreciate him in the round we have to note the conservatism that was deep in his nature. At a time when many enlightened men were embracing the new cosmology, Harvey's outlook was firmly Ptolemaic. This cannot but be strange to us, since Galileo was teaching at Padua

when Harvey was a student there. It is true that Harvey left Padua in 1602 and Galileo's first publication in support of Copernicus was in 1613. But thereafter his views spread rapidly throughout Europe. Nevertheless, in the *De Generatione*, published in 1651, Harvey remarks: "As the sun, now in the East and then in the West, completes the measure of time by his ceaseless revolutions."

Harvey's cosmic background was essentially mediaeval. For him man and his earth were the centre and pivot of the universe round which the sun and stars revolved, bringing to man his day for work and his night for sleep, the seasons and all the influences that flowed in from the macrocosm on man, its epitome or microcosm. "For indeed," he says in one place, "all things seem to derive their origin from a celestial influence, and to follow the movements of the sun and stars"; or again: "The cock and the hen are especially fertile in the spring; as if the sun, or heaven, or nature, or the soul of the world, or the omnipotent God—for all these things signify the same thing—were a cause in generation superior and more divine than they; and thus it is that the sun and man, that is the sun through man as the instrument, engender man."

The cosmic order for Harvey was still undisturbed by the heresy of Galileo. It was the cosmic order of the astrologer mellowed by time and robbed of its sorcery and magic. For already there was coming into it an awesome sense of law. But it still retained its mediaeval pattern. We can, from the many allusions in his works, recognize that to Harvey nature, in all its varied operations, inanimate and animate, was the grand instrument of the supernatural powers, with its many functions delegated to a vast descending hierarchy of agencies, whose importance decreased in gradual diminuendo the farther their remove from the Prime Cause. It was the cosmic order which Shakespeare had enshrined in his memorable lines:

The heavens themselves, the planets, and this centre
Observe degree, priority, and place,
Insisture, course, proportion, season, form,
Office and custom, in all line of order:
And therefore is the glorious planet Sol
In noble eminence enthron'd and sph'ring
Amidst the other . . .

. . . but when the planets,
In evil mixture to disorder wander,
What plagues, and what portents! what mutiny!
What raging of the sea! Shaking of Earth!

.
Take but degree away, untune that string,
And, hark, what discord follows!

(*Troilus and Cressida*, Act 1, Scene 3.)

These agencies had, as their handmaidens in the sub-lunary sphere for the performance of the different functions of the living organism, the three souls of Aristotle: the vegetative soul by which growth and reproduction are performed; the sensitive soul by which the organism appreciates and reacts, chiefly by motion, to its environment; and, in the case of man alone, the rational soul. Entering intimately into all life processes, as the corporeal means by which the incorporeal souls carry out their functions, there are the three spirits of Galen: natural, vital, and animal. It is possible that Harvey had departed from the grand triad of Galenical spirits, for in one place he says: "Physicians admit as many spirits as there are principal parts or operations of the body—viz., animal, vital, natural, visual, auditory, concoctive,

generative, implanted, influent, etc., etc." Amongst the greatest celestial gifts is that of the "innate heat," the *calidum innatum*, the gift of life itself.

His Handicap in Study

We have seen that Harvey was from the outset gravely handicapped in his study of the phenomena of generation by the lack of the microscope. As a result some of the most fundamental claims in the *De Generatione* are based upon error. Take, for example, his failure, after repeated and scrupulous study of the genital canal of the hen, deer, etc., to find any trace of seminal fluid after mating. He insists that "after intercourse there is nothing more to be found in the uterus, than there was before the act. And when this shall have been afterwards clearly established and demonstrated to be true of all kinds of animals, which conceive in a uterus, it will at the same time be equally evident that what has hitherto been handed down to us from all antiquity on the generation of animals, is erroneous; that the foetus is not constituted of the semen either of the male or female, nor of the mixture of the two, nor of the menstrual blood." This led him to what now seems to us as the monstrous error that fertilization takes place by a sort of immaterial contagion, a kind of spiritual influence "analogous to the essence of the stars," by "virtue of a divine agent as things are set fire to and blasted by a spark . . . or lightning." But to appreciate properly the workings of Harvey's mind we have to recognize clearly that this conclusion followed many careful and painstaking observations. It was a deduction that had the sanction of a truly scientific method. It was for Harvey a very important deduction, for it contradicted the Aristotelian view that the ovum arose from the fusion of the menstrual and seminal fluids. Moreover, it was in keeping with Harvey's continual pre-occupation with the relative insignificance of the material elements in generation.

His Interpretation of "Matter"

His attitude to "matter" is to the modern reader one of the most interesting features of Harvey's outlook. For him the material cause in the processes of life comes low down among the four causes of Aristotle. I find it difficult to define exactly the Harveian interpretation of matter, although I have been to some pains in my attempt to understand it. Perhaps the viewpoint can be brought before the mind more vividly by a quotation from his discussion of the material source of the different parts of the body and on whether these are "both engendered and nourished by diverse matters (as other workers have maintained), either the blood or the seminal fluid; viz., the soft parts, such as the flesh, by the thinner matter, the harder and more earthy parts, such as the bones, etc., by the firmer and thicker matter."

Harvey will have none of this subservience to matter, this "prevalent error," as he calls it. "Nor do they err less," he says, "who, with Democritus, compose all things of atoms; or with Empedocles, of elements. As if generation were nothing more than a separation or aggregation or disposition of things." He has to accept the elements of Empedocles—air, earth, water, and fire—but these "so-called elements . . . are not prior to those things that are engendered, or that originate, but are posterior rather—they are relics or remainders rather than principles." It is "an argument of no great cogency to say that natural bodies are primarily produced or

composed of those things, into which they are ultimately resolved; for upon this principle some things would come out composed of glass, ashes, and smoke." For him the substance of life has a mystical unity, unsullied by any material contacts. It is "a mere homogeneous . . . jelly . . . and from this, under the law of generation . . . as by a divine fiat, from an inorganic an organic mass results." For Harvey the substance from which life takes its origin and its eventual shape is in its beginnings entirely homogeneous. To conceive it as containing within itself elemental differences as the basis for the subsequent development of the various organs is to endow the substance with a significance which it does not possess and to abrogate the power of the generative force to mould matter to its will.

Views on Conception

In his view of conception we have evidence of the sheer delight which Harvey takes in allowing his imagination to range in the realms of the immaterial. He finds much "to admire and marvel at in conception. It is a matter, in truth, full of obscurity; yet will I venture to put forth a few things—rather though as questions proposed for solution." He returns to his demonstration at an earlier stage that the woman is "fecundated without the co-operation of any sensible corporeal agent, in the same way as iron touched by the magnet is endowed with its powers. . . . When this virtue is once received the woman exercises a plastic power of generation, and produces a being after her own image." He then proceeds to repeat the description of the changes in the uterus as he had "found them by observation" in the various animal species which he had dissected. "Its inner surface, the future residence, that is, of the conception, becomes softer, and resembles in smoothness and delicacy the ventricles of the brain."

Then there is for him the grand and inevitable conclusion that "since the substance of the uterus, when ready to conceive, is very like the structure of the brain, why should we not suppose that the function of both is similar? . . . For the functions of both are termed 'conceptions,' and both, although the primary sources of every action throughout the body, are immaterial, the one of natural or organic, the other of animal actions." It is important to recognize that the term "animal" here refers to the function of the "anima"—the mind or, rather, the soul. It is in pushing home his argument that Harvey here makes use for the first and only time of the syllogism in the true scholastic manner. Let A stand for the fertile egg or the "material cause" of the chick and B for that which fecundates the egg—that is, the "efficient cause" of the chick. Let C be the chick itself—that is, the "final cause" or the immaterial "form" or "species," the reason why the chick is. Whenever B exists C also exists. Whenever A exists B also exists. Therefore whenever A exists C also exists. From this we may conclude that "the 'species' or immaterial 'form' of the future chick are, in some sort, the cause of the impregnation or fecundation of the uterus, because after intercourse no corporeal substance can be found within that organ." Here, in his employment of the various "causes" and of the immaterial "species" or "form," Harvey reveals himself as the true Aristotelian.

While we may thus in humility, and hence with understanding, accompany a great mind in the passionate and yet unavailing struggle towards the truth, we cannot

help, from our privileged position, recalling the criticism, quoted earlier, which Harvey levels against the "erroneous and almost foolish" methods of those by whom "single universal conclusions being deduced from several premises, and analogies being thence shaped out, we have frequently mere verisimilitudes handed down to us instead of positive truths."

Harvey's Mysticism

We have seen how the stars enter into the processes of generation. But the full import of these beliefs is revealed when Harvey deals with the blood. Here we come face to face in fullest measure with the mysticism that enters so largely into Harvey's attitude to nature. His descriptions of the blood are suffused with a remarkable glow, and we come upon Harvey as the poet transported into the empyrean by the sheer passion of his contemplation of the divine made flesh. To quote: "The blood, therefore, by reason of its admirable properties and powers, is 'Spirit.' It is also celestial; for nature, the soul, that which answers to the essence of the stars, is the inmate of the spirit, in other words, it is something analogous to heaven, the instrument of heaven, vicarious of heaven." Here we have a further glimpse of the cosmic order in which Harvey believed. Again: "Contained within the veins, however, inasmuch as it is an integral part of the body, and is animated, regenerative, and the immediate instrument and principal seat of the soul, inasmuch, moreover, as it seems to partake of another more divine body, and is transfused by divine animal heat, it obtains remarkable and most excellent powers, and is analogous to the essence of the stars. In so far as it is spirit, it is the hearth, the vesta, the household divinity, the innate heat, the sun of the microcosm, the fire of Plato."

The primacy of the blood is established by the fact that it is the first part of the animal to be formed. "We are to reject the views of certain physicians, indifferent philosophers, who will have it that three principal and primogenate parts arise together, viz.: the brain, the heart, and the liver; neither can I agree with Aristotle himself, who maintains that the heart is the first engendered and animated part; for I think that the privilege of priority belongs to the blood alone. . . . There appears at first, I say, a red-coloured pulsating point or vesicle . . . and, in so far as we are enabled to perceive from the most careful examination, the blood is produced before the punctum saliens is formed." The supremacy of the blood is further apparent from the observations that the pulse is derived from it, for "the diastole . . . takes place from the blood swelling, as it were, in consequence of containing an inherent spirit." The action of the heart is "produced by a double agent: first, the blood undergoes distension or dilatation, and secondly, the vesicular membrane of the embryo in the egg, the auricles and ventricles in the extruded chick, effect the constriction." In other words, the dominant element in the heart's action is the diastole produced by the swelling of the blood by virtue of its innate heat; the systole is the muscular recoil.

Harvey is at great pains to show that the blood is from the beginning endowed with its superlative powers and that thereafter it is self-sufficing and independent of the elements. It is, or possesses, the "animal heat, in so far, namely, as it is governed in its actions by the soul; for it is celestial as subservient to heaven; and divine, because it is the instrument of God the great and good."

A Comparison in Philosophies

Sherrington (*Man on His Nature*, Cambridge University Press, 1946) has recently published a sympathetic study of Fernel, the great French doctor-philosopher, who lived a century before Harvey and whom Harvey quotes once in *De Generatione*. This analysis invites a comparison between the philosophies of the two men, from which we get a forcible impression of the similarity of their views despite their wide separation in time. In his general conception of the cosmic order and its relation to the operations of the animal body, in his preoccupation with the stock-in-trade of the ancient philosophers, the souls and causes and forms, the innate heat and the immaterial elements in nature, Harvey has much in common with his illustrious predecessor. But, whilst in Fernel authority still retained a supreme place, there is in Harvey a novel urge to test each fact by direct observation. Nevertheless it is clear that the mediaeval still had its firm hold on the mind of our great countryman, who is presented through his works as a kind of dual personality—an epitome, as it were, or reflection of the conflict in loyalties that belonged to the period of great transition in which he lived.

We have clear evidence that Harvey had a strong element of reaction within his nature. We have seen that he allowed the revolution of cosmological thought to pass him by. There is a measure of irony in the fact that in his contempt for "matter" and of the "chymists," who trafficked in "matter," he of necessity remained aloof from the increasing interest being taken in the inner structure and properties of matter, by which his own problems were alone to find their solution. But for him the "chymists" were in the main mere dishonest alchemists and sorcerers, and it was still to be some time before Boyle established the repute of the chemist, and a considerable time was to elapse before Black was to throw light on the source of animal heat.

But in some ways we find the greatest irony of all in the fate of his discovery of the circulation of the blood. We have already alluded to the fact that Descartes was one of Harvey's early converts. He employed Harvey's descriptions in his argument that the animal body is to be regarded as a complex machine. In his *Discourse on Method* (1637) he reproduces Harvey's account of the circulation and argued by analogy that, as the blood tubes carry a vital fluid, the nerves, distributed throughout the body on a similar pattern, must be tubes conveying a fluid to the brain with sensations and from the brain for muscular action. It is true that Descartes himself regarded the body "as a machine made by the hands of God," but it is nevertheless the case that his views were in the end to usher in the materialism of the eighteenth century. Thus, whilst Harvey was describing the blood, with its celestial powers, as the "sun of the microcosm," Descartes was explaining the circulation and the bodily functions in terms of physics. We thus have the spectacle of Harvey's own work largely contributing, in the early seventeenth century, to the final replacement of the Solar deity within the microcosm by a rigid mechanism, just as, later in the century, Newton, following Kepler and Galileo, established the rule of mechanical law in the macrocosm. Harvey has his share in the final collapse of the Ptolemaic system and its celestial ministrations, in which he fervently believed.

It has sometimes been maintained that the highly speculative nature of much of the *De Generatione*,

resulting in conclusions often subsequently overthrown, argues the work of an ageing man. The book was, it is true, published in 1651, when Harvey was 73 years old, but there is good evidence that he was actively engaged in his studies even before the appearance of his *De Motu* in 1628. Indeed, some remarks in the *De Motu* suggest that he had reached several of his main conclusions before that date.

The Speculations of Genius

The difference in the standards of lasting achievement in Harvey's two works is more convincingly to be found, as we have already suggested, in the nature of the respective studies. They were the work of the same keen mind, of the same keen imagination, but from the nature of things they differed in the degree in which theory was based upon reliable observations. In the one the data were there both to inspire and to "prove" the theory; in the other they were at that era beyond the ken of man. As Harvey, himself conscious of the scepticism which he was sure to meet, says in his chapter on conception: "Yet this I do is the practice of philosophers who, when they cannot clearly comprehend, how a thing really is brought to pass, devise some mode for it in accordance with the other works of nature, and as near as possible to what is true. And indeed all those opinions, which we now regard as of the greatest weight, were at the beginning mere figments and imaginations, until confirmed by experiments addressed to the senses."

Were it possible it would still be unprofitable to seek to restrain the speculations of genius. Descartes, possessing kinship to Harvey both in outlook and in time, would suffer heavily under such a charge, for did he not explain the universe in terms of a vortex theory, and did he not place the rational soul in the pineal gland? Many of the speculations of the greatest philosophers and scientists have suffered badly at the hands of time.

Both in his work on generation and in that on the circulation Harvey found it necessary to invoke the influence of the stars. In the former we are at the end largely left with the stars so far as its major themes are concerned. In the latter the blood is "the sun of the microcosm" and the stars are still in control, but the mechanism by which this celestial influence achieves its purpose is revealed to us. The Harveian method, with its grand synthesis of the searching eye and the comprehending mind, unlocks for us the secret and places medical science for ever in its debt. The climax of discovery is almost hidden in the simplicity of its statement: "Coepti egomet mecum cogitare, an motiorem quandam quasi in circulo haberet, quam postea veram esse referi" (I began to think whether there might not be a motion, as it were, in a circle; this I later found to be true).

According to a recent report in the *New York Times*, experiments on the preservation of food by atomic radiation are now in progress at the University of Michigan. Homogenized pasteurized milk was sealed in plastic bags and exposed to the radiation from radioactive Co⁶⁰ for 24–40 hours. After three weeks at room temperature (77° F.—25° C.) it was still more or less normal, while control samples, also in plastic bags but not irradiated, turned sour in 24 hours. Likewise beef bought locally kept fresh for three weeks after irradiation, whereas controls were bad in 48 hours. Experiments have also been made with fruit and vegetables, but so far without satisfactory result.