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Prefazione/*Preface*

This collection of essays owes its origin to a Colloquium on "Matter and Life" held at the University of Cassino on 15th and 16th December 2000. The colloquium focused on various themes related to the theories of matter, of generation, and to the models of living bodies in Renaissance and early modern Europe.

The aim of the colloquium was to investigate the relations between theories of matter and the sciences of life and medicine, and to contribute to the on-going reconsideration of the traditional interpretation of the scientific revolution as based on the mathematisation and mechanisation of the world view. In the past decades, significant changes occurred in the understanding of early modern theories of matter. By shedding light on previously little-known sources, recent scholarship has dismissed the traditional view of the mechanical philosophy as the crowning achievement of early modern corpuscularianism. It is now apparent that the view of matter as inert and the reduction of all phenomena to the impact of corpuscles was not so widespread as historians have claimed. Investigations of the ultimate components of bodies were closely linked to the study of the origin of living bodies. As shown by the works of Daniel Sennert, the emergence of corpuscular theories of matter did not bring about an immediate and complete rejection of the Aristotelian notion of substantial forms from natural philosophy and medicine. Modern scholarship made it clear that in the age of the scientific revolution the notion of *spiritus*, that was central to both Galenic and Arabic medicine, was not dismissed, but was often reinterpreted in corpuscular and chemical terms. It is well known that Francis Bacon adopted the concept of *spiritus* in his philosophical works. This notion was also crucial in his medical investigations, notably in the newly discovered work on the prolongation of life (*De vijs mortis*).

The links between medicine and corpuscular philosophy – to be found in the ancient Methodist school - became stronger in the Renaissance, when the rediscovery of ancient atomism brought about a new interpretation of contagious diseases. Throughout the 17th century, changes occurring in chemistry

and matter theories had a significant impact on the development of life sciences and medicine. In order to understand processes involved in nutrition, reproduction, motion and perception, a number of scientists and physicians had recourse to a particulate theory of matter. Various theories associated life with special substances or chemical processes, notably fermentation. Ferments and fermentation - notions heretofore largely neglected by historians - were central to 17th medicine and science. In the 17th century they were commonly adopted as explanations of a variety of physiological processes, including the origin of life. The concept of fermentation was widely adopted in the study of fevers, yet different interpretations of the process emerged in the course of the 17th century. The early theory that ferments were the origin of fermentation was replaced by the view of fermentation as the result of chemical reactions involving a variety of chemical substances, in particular acids. As a result of the debate on the origin of fermentation, namely on the role of acids in fermentative processes, at the end of the 17th century a number of physicians maintained that fermentation did not occur in healthy bodily conditions, but was only associated with pathological manifestations. Fermentative processes were also explained in mechanical terms - namely, as the result of a spatial rearrangement of corpuscles.

In their struggle to investigate problems related to life, scientists produced a variety of versions of the corpuscular philosophy, not only mechanical, but also based on the view that some particles of matter were endowed with powers, life and perception. Discussions about the origins of life, involving material transformation and activity, contributed to the idea that in special cases matter - far from being inert - could be endowed with motion and life. In other words, some corpuscles of matter (notably *semina*) were deemed as active principles, namely, they were capable of altering and receiving different shapes, motions and properties. In the 18th century theories emerged explaining life by means of particles of a particular kind, namely living molecules. Furthermore, morbific particles could affect living bodies and produce a variety of diseases. Borelli and Malpighi, two scientists who adopted mechanical explanations of natural and

medical phenomena, had recourse to the view that particles of matter were endowed with activity and with a principle of life. Recent investigations of formerly little-known sources make it clear that atomism was a major concern of medical science in Italy in the late 17th century. It can be held that the idea of the 'atoms of living bodies' ('atomi dei viventi') - a transformation of Sennert's *minima* – became a viable notion in life sciences throughout the 17th and 18th centuries.

Historians have rightly emphasized the importance of the mechanical philosophy in the study of living bodies, in particular Descartes', view of animals as machines. It is however apparent that the impact of Descartes' mechanical philosophy in life sciences was less pervasive than historians have usually thought. Chemical theories were widely adopted in the explanation of the development and activity of living bodies. It is apparent that iatrochemistry and iatromechanics were not always regarded as separate and mutually incompatible sets of theories. Recent historiography, as well as the present collection of articles, offers a new and more sophisticated interpretation of the interplay between these two views. Chemical and mechanical theories were both used to interpret different ranges of phenomena, and the same phenomenon at different levels.

Views of nature, as well as metaphysical and religious assumptions, strongly affected explanatory models and classification systems of living bodies. The link between philosophical ideas and the classification of plants became apparent in 18th-century discussions on the status of imperfect plants, as well as on their generation. It is apparent that Francesco Redi's justly famous experiments did not put an end to the theory of spontaneous generation. The importance of this topic in the 18th century is now assessed by a number of scholars. The debate over generation was not confined to professional scientists but also involved scientific writers and journalists, as the anonymous authors who contributed to the investigation in the field.

The study of the interplay between religious motives and scientific research in the life sciences has often been one-sided, focusing on attempts by religious authorities - especially in

catholic countries - to censor the *libertas philosophandi*. In fact, even while they were perceived as a constraint or a hindrance (which they often were), religious motives could also represent a resource for scientific and medical research, offering suggestions and even solutions to some long-standing questions, as in the case of Sennert's theory of the transmission of the soul to the embryo.

The life-matter question stood at the very heart of Leibniz's speculations, which were interwoven in a web of metaphysical ideas. For this reason historians have often placed Leibniz's views outside the development of life sciences. It is now clear that their impact on 18th-century research in life sciences was by no means marginal. The case of Charles Bonnet shows that Leibniz's view of organisms paved the way to the development of life sciences of the late 18th century.

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Articoli/*Articles*

THE REVIVAL OF LUCRETIAN ATOMISM AND CONTAGIOUS DISEASES DURING THE RENAISSANCE

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SUMMARY

This article examines the influence of Lucretius' De rerum natura *on the theory of contagious diseases which Girolamo Fracastoro developed during the second decade of the 16th century. It is apparent that the use of the concept of* semina morbi *was neither an anticipation of modern germ theory, nor a mere adaptation of the terminology of classical atomism. In fact, the combination of the humanist interest in the poem of Lucretius with a renewed attention towards direct observation resulted in the publication in of Fracastoro's* De morbo gallico *(1530), containing an innovative and effective interpretation of the notion of contagion.*

The atomism of the ancients, at least in the aspect presented to us by Epicurus and Lucretius ... was not a scientific theory, and though some of its precepts ... seem to lead to the unification of the world achieved by modern science, it has never yielded a foundation for the development of physics. Indeed, its revival by Gassendi remained perfectly sterile. The explanation of this sterility lies in the extreme sensualism of the Epicurean tradition[1].

This insightful but harsh judgement of Alexandre Koyré has exerted an influence whose consequences are still visible today in the vast majority of studies dedicated to the history of scientific atomism. For those who, like Koyré, identified the scientific revolution with the geometrisation of the universe, it was

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