

De Artificio Mechanico Musculorum: Teleological and Mechanical Reasoning in William Harvey's *De motu locali animalium*

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The rise of the Mechanical Philosophy and the New Science in the 17th Century is often understood to involve the wholesale rejection of teleological reasoning in natural philosophy in favor of mechanical reasoning. However, one of the “heroes” of the New Science, William Harvey, was a conspicuous Aristotelian who maintained a prominent place for teleological explanation in anatomy while at the same time emphasizing the importance of mechanical reasoning. In fact, he does so in a way that avoids treating mechanical and teleological approaches as mutually exclusive explanatory strategies with non-overlapping explananda. Instead, in Harvey we find an integration of mechanical and teleological explanation. This approach is especially evident in a relatively unexamined set of notes on the anatomy of muscles.

Most scholarly attention given William Harvey has centered on the *De Motu Cordis* of 1628 and its reception. This focus is not without reason, as it is to this work that his near contemporaries gave most attention and (eventually) praise. Disproportionately little attention has been given to his other, much more massive publication on the generation of animals; and even less still has been given to his various unpublished notes. Among these latter is the above mentioned collection of notes on the local motion of animals and the anatomy of the motive organs, particularly muscle; it was edited and translated by Gwenneth Whitteridge and published as *De Motu Locali Animalium, 1627(MLA)* in 1959. Though generally overlooked in the limited literature on these notes, Harvey displays here a significant preoccupation with mechanics and the role of mechanical reasoning in anatomy. In these notes we find a number references to the pseudo-Aristotelian *Mechanical Questions* and a clear sketch of the nature of mechanics and its place in the study of the anatomy of muscles. Making use of Aristotelian-Galenic distinctions between the structure, movement, action, use and utility of muscles, Harvey identifies a significant cluster of anatomical features of muscle which he suggests are only properly understood when both mechanical and teleological resources are marshaled in their explanation. This integrated approach is reflected in the large-scale structure of the notes and is specially articulated in one chapter entitled “*De Artificio Mechanico Musculorum.*”

The careful examination of the integration of teleological and mechanical reasoning in MLA, *largue*, also sheds some light on the complicated interaction between Harvey’s Aristotelian project in anatomy and the developing Mechanical Philosophy. To understand Harvey’s approach it is helpful to distinguish various interrelated developments in the 17th Century associated with the rise of “mechanism”: (1) the advances in the mathematical science of mechanics in the tradition of Archimedes and/or the pseudo-Aristotelian *Mechanical Questions*; (2) the rise of natural philosophies that see as legitimate reference to only a restricted set of attributes, e.g. extension, motion, etc.; (3) the increasing heuristic use of machine analogies in the explanation of complex natural phenomenon. Harvey’s MLA is not properly characterized by any of these: he is not advancing the mathematical science of mechanics here; he is not making extensive heuristic use of machine analogies; nor is he limiting his explanatory resources to characteristically mechanical ones.

Rather, Harvey’s extension of mechanism involves attempting to identify a pocket of features in one science (anatomy) the proper understanding of which requires the application of the concepts of the mathematical science of mechanics. Harvey’s approach is helpfully illuminated by comparing it to

Aristotle's characterization and practice of the "science of the rainbow" in *Posterior Analytics* I.13 and *Meteorology* III respectively. This is perhaps not surprising given Harvey's careful examination of Aristotle's corpus; it is even less surprising, however, if one notes that Aristotle himself seems to be making tentative steps in this direction in two texts amply referenced in the MLA and most relevant to the study of the anatomy of muscles: *De Motu Animalium* and *De Incessu Animalium*.

My analysis of Harvey's MLA suggests that the relationship between the rise of mechanism and Aristotelianism in the 17th Century is more varied and fruitful than often suspected.