

Review submitted to *Mathematical Reviews*

Blaise de Parme, *Questiones circa Tractatum Proportionum Magistri Thome Bradwardini*

This careful edition, provided with an illuminating introduction, is a significant contribution to the history of Mathematics. Blaise de Parme's tract is a good example of the mathematical teaching given in Italian universities at the beginning of the 15th century. As is well known, one of the distinctive features of the period is the application of Mathematics to natural philosophy, in particular, to the study of motion. This set of 'quaestiones' is an original example of this, which contains not only clever criticisms to a number of Aristotelian assumptions, but also to some of the renowned mathematicians of the late Middle Ages, such as Nicole Oresme and Thomas Bradwardine himself. The chosen quaestio-form allows Blaise to include not only mathematical and physical considerations, but also epistemological reflections on the status of mathematical objects.

The tract contains twelve 'quaestiones'. Questions 1 to 7 are intended to clarify the mathematical notion of 'proportion', and questions 8 to 12 are concerned with its application to the science of motion. The first question "Utrum contingat omnem motum alteri in velocitate et tarditate proportionari" solves the main difficulties by using the distinctions between 'proportio communiter dicta' and 'proportio proprie dicta', on the one hand, and between 'proportio rationalis' and 'proportio irrationalis', on the other. Question 2 "Utrum proportio proprie dicta sit duarum quantitatum unius ad alteram invicem habitudo" shows Blaise's ontological and epistemological assumptions: the aristotelian accidents (proportions belong to the category of quantity) are identified with the things themselves, but proportions are distinguished 'secundum rationem' from the things compared. Question 3 "Utrum proportio irrationalis possit in numeris reperiri" deals with the notion of 'number', showing the difference between the point of view of the mathematician and the point of view of the physicist, and raising some difficult questions concerning the continuum and the infinite. Question 4 "Utrum dyametri ad costam sit proportio rationalis" exhibits a number of arithmetical and geometrical assumptions, from which several conclusions are deduced. Question 5 "Utrum omnes proportiones sunt equales quarum denominationes sunt equales" clarifies the notion of 'quantity' and shows again the subjacent ontology. Question 6 "Utrum cuiuslibet duobus extremis datis, interposito medio uno vel pluribus cuius ad utrumque extremorum sit aliqua proportio, proportio extremi ad extremum componatur ex proportionem primi ad secundum et secundi ad tertium et sic deinceps" highlights the difference between 'being composed of some proportions' and 'being produced by some proportions', and notes that Bradwardine did not properly make the distinction. Question 7 "Utrum proportionem equalitatis sit aliqua proportio maior" includes several rules for operating with proportions, both rational and irrational, and also some rules concerning increasing and decreasing proportions. Question 8 "Utrum in omni motu potentia motoris debeat excedere potentiam rei mote vel equari ei" clarifies the notions of 'potentia activa', 'potentia pasiva' and 'resistentia', explaining the different connotations of the terms, and then explores the differences between alteration and local motion. Question 9 "Utrum ab omni proportionem maioris inequalitatis proveniat certa velocitas" which is affirmatively answered, raises an important problem that will be solved in the tenth question "Utrum in motibus velocitas insequatur proportionem potentiarum motivarum ad suas

resistentias, ut effectus causam": here Blaise clarifies the notion of 'velocitas' and offers a solution that explicitly contradicts Aristotle's and Bradwardine's authority. Question 11 "Utrum velocitas in motibus sit attendenda penes maximum effectum in tanto vel in tanto tempore acquisitum vel acquisibile" is very long, as it contains a follow-up of the previous question concerning the cause of velocity, and then it treats separately the problem for local motion (be it rectilinear, circular, or rotation), for alteration (where Blaise explains the notion of 'latitudo', corresponding to qualities that change gradually), and for increasing. It also includes the analyses of several cases that raise special difficulties. In question 12 "Utrum elementa sint invicem proportionalia proportionalitate continua" Blaise deals with another application of the theory of proportions, showing his disagreement with the master he is commenting, and developing a number of physical arguments for his own opinion. In sum, Blaise's tract has the importance of being the starting point of a new way of teaching the theory of proportions and its application to the science of motion.

Paloma Pérez-Ilzarbe (Pamplona)