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GALEN'S METHOD OF INQUIRY AND PROOF: STUDIES ON ANCIENT FOUNDATIONS OF RATIONAL MEDICINE

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INTRODUCTION

This dissertation consists of studies dedicated to the ancient doctor and philosopher Galen of Pergamum (129–ca. 216) and his method of scientific inquiry in the areas relevant to medicine, esp. physiology, therapeutics, and pharmacology. It is a sequel to (Havrda, 2011 and Havrda, 2016), where I showed that the methodological sections in the so-called eighth *Stromateus* by Clement of Alexandria are excerpted from Galen's lost treatise *On Demonstration*. Following the pioneering (Tieleman, 1996) – who mainly deals with one argument in one treatise, namely, the argument about the location of the ruling faculty of the soul in Galen's *Doctrines of Hippocrates and Plato* – this book sets out to reconstruct Galen's methodological tenets against the backdrop of a wider selection of cases and their interpretation, aiming to reach a more differentiated and

sharper picture of Galen's method than has been available so far.

Like Aristotle, Galen is convinced that scientific knowledge is more than a collection of observations or generalizations organized in a certain way. Even though, for him, as for Aristotle, all our knowledge of the perceptible world starts from, and depends on, perception and observed correlations ('if X then Y' or 'Y belongs to X', either always or for the most part), it is the task of science proper to discover *why* things happen as they do. Discovering why P (where P is a correlation under inquiry) then amounts to finding a causal connection between indisputable truths and P, whereby P is not only shown to be the case, but also explained.

The question for inquiry, then, is this: how can such a causal chain, and the respective explanation, be found? This was the question tackled in Galen's *On*

Demonstration – Galen's own updated version of Aristotle's *Posterior Analytics*, written in view of philosophically minded doctors –, and one that he tackles in practice on numerous occasions of his extensive *oeuvre*. The task for a modern interpreter is to collect the bits and pieces of his answer from these various contexts and put them into a coherent whole. The aim of these studies is precisely that.

I

The first chapter, after providing a general introduction to Galen's attitude to logic and his project of reliable scientific method in medicine, discusses the simplest and most instructive example of scientific demonstration in Galen's extant works, namely, the demonstration that the ruling faculty of the soul is located in the brain. The argument

runs as follows: "Wherever the beginning of the nerves is, there is the ruling faculty of the soul. But the beginning of the nerves is in the brain, and so the ruling faculty is there." Analyzing this famous argument, I focus on the notion of appropriate premisses, a key feature distinguishing a scientific argument from other sorts of arguments in Galen's view, whether dialectical, rhetorical, or sophistic. I argue that the notion of "appropriateness" has not been interpreted correctly by previous Galenic scholarship, as it has not been grasped with sufficient precision what the appropriate premisses of a demonstration are supposed to be appropriate to.

The question is one of explanatory relevance: like Aristotle's, Galen's natural science is problem-based, and one of the key jobs of a scientific explanation is to provide an account that is not only true and based on evidence, but also relevant to a specific point at issue. In the present case,

as Galen explains, the premisses showing that the ruling faculty is located in the brain must be taken from the essence of "the thing sought". This does not mean that they have to be taken solely from the definition of the ruling faculty of the soul, or – as Tieleman argues – from the properties of the organ considered as the sought-for solution (heart/brain) – even though both the definition of the ruling faculty and the investigation of the proposed organs are prerequisite for the discovery of these premisses. Rather, they have to be taken from the very point at issue (the thing sought in the problem), the point at issue being the place where the ruling faculty is. Only premisses derived from the essence of the point at issue, i.e., in this case, from what-it-is for something to be where the ruling faculty is, are considered scientific in Galen's view. Those that do not meet this objective, true and evidence-based as

they might be, are not scientific, as they do not produce knowledge regarding the point at issue.

II

The second chapter focusses on another characteristic feature of Galenic science that is less often observed in scholarship. Galen develops his method partly in response to the sceptic objection from disagreement, according to which mutually conflicting views about the same thing, produced by different "dogmatic" schools, invalidate one another. His regard for the sceptic objection, which he takes seriously (and, to some extent, shares), explains the important role of agreement in Galen's methodology: finding an agreed starting-point is not a sufficient but a necessary condition for an argument to succeed and deliver what Galen describes as "scientific credence"

(ἐπιστημονικὴ πίστις). It also determines the agenda of Galen's discussions: the problems discussed and solved by a demonstrative method are typically ones that generate mutually conflicting views. Here, as elsewhere, Galen's approach is in many respects traditional: Aristotle defines problems as *controversial* issues or those on which people have no opinion at all. Surely for Galen, as for Aristotle, controversy is a typical reason why an issue is taken up in his works.

In the second chapter I explore this aspect of Galen's methodology on the example of problems discussed in his lost *On Demonstration*, in particular the question of the causes of vision. I argue that Galen's choice of topics dealt with in this treatise is partly determined by his attempt to show how demonstrative methods are useful in solving controversies. Even more interestingly, however, Galen seems to be concerned in defending, against the

sceptic objection, a common-sense view of things that are functionally operative in our lives (the procatarctic causes, the critical days of disease, for example) or plainly exist (time), but cannot be defined or proved in a properly scientific manner.

III

In the third chapter I take up three specific problems discussed by Galen, and explore his method of dealing with them. Each problem represents a different area of research and showcases a different aspect of the method.

1. The first problem, dealt with by Galen by way of a diatribe, is whether "hygiene" (the art of preserving health) belong to medicine or to "gymnastics" (the art of bodily training). It is not a properly scientific inquiry, as it does

not lead to a causal account of anything. But, like the question of whether the embryo is an animal or not, it reveals a general strategy of Galen's approach to problems. The problem consists of two propositions, each expressing a relation between two terms (hygiene – medicine, hygiene – gymnastics), and the question is, which of the two predicative relations holds. The first step, which in fact consumes the most part of the discussion, is reaching an agreement about the meaning of the names used ("hygiene", "medicine", and "gymnastics") and of the peculiar relation under inquiry ("belongs to"). This corresponds to the phase of "recognizing the problems", as explained on the example of the embryo-animal issue in *Dem.* But it proves to be extraordinarily difficult to find a non-question-begging description of the point at issue based solely on the meaning of the names involved. The inquiry needs to turn to the problem as a whole and grasp

its “essence”, in other words, “the thing sought”, in a way that could be accepted by both sides of the issue. Only when the thing sought is properly defined (that art, namely, to which hygiene belongs) can the issue be decided in a non-partisan way, on the basis of a firm criterion.

2. The second example concerns the question of the method of healing. This is of course the core question of rational medicine: whether there is any method by which we might arrive at the proper therapy of every disease, and what method it is. The Empiricist school of medicine denied that there is any such method, and claimed that therapy is basically a matter of repeating the treatment discovered by chance that turned out to be successful in similar instances in the past. Here again, Galen’s starting-point is the explanation of the meaning of the names involved – “disease” and “therapy” – followed by the attempt to grasp the essence of the problem. The crucial

tool is division: in order to determine how to deal with diseases, we need to find out, first, what disease is, and how many kinds and what kinds of diseases there are. This procedure is neither arbitrary, nor is it purely semantic. It must be based on the investigation of the subject matter itself. For, if disease is an impairment of activity, and if the impairement is brought about by a particular condition of the bodily part whose activity it is (a determination which can be reached on the common-sense semantic grounds), then the division of the kinds of diseases must be based on the investigation of the bodily parts and the causes of their impairment. This, in turn, is a matter for physiology, based on observation and well-differentiated, experienced-based causal inferences. Set on this firm physiological ground – laid down in other treatises – the question of therapy (again, when the name "therapy" is properly explained as the restoration of a healthy condition) can also be grasped

in its essence, namely, in terms of the actual practices required by a particular type of disease. This includes the application of drugs described in terms of their effect on the body.

3. The third example is taken from Galen's pharmacology. Galen's elementary physics, which attributes natural powers to mixtures of primary tangible qualities (hot, cold, dry and wet) of which all natural bodies are composed, allows him to explain the efficacy of natural substances used in medicine in terms of particular mixtures. The case in question is olive oil. Galen's discussion of this substance, which covers much of the second book of his *Mixtures and Powers of Simple Drugs*, is framed by a polemic against certain Archidamus. Galen castigates him for having arrived at a mistaken account of oil's nature (namely, that it is warm), because he has generalized from a limited set

of observations of questionable relevance. In contrast, Galen proposes an orderly course of inquiry, which starts from the complete account of the oil's observable attributes and proceeds towards causal investigation by means of their empirically testable differentiations. Again, the inquiry involves the familiar steps of determining the meaning of the proposed name (the word for "oil" being used both generically and specifically), followed by the investigation of the essence of the problem. Out of a set of observations regarding the olive oil (which ought to be as complete as possible) the researcher must select those relevant to the point at issue, i.e. those indicating its nature, rather then being due to any accidental circumstance of its production and use. Only when the relevant attributes are isolated in the process of "differentiation" (διορισμός) – which involves the testing of the effects of the substance in various conditions and on different subjects – can we draw

a conclusion regarding the natural qualities of the substance.

Thus, all three examples discussed in this chapter seem to represent different aspects of one and the same method of dealing with problems. In *Thrasyboulos*, the lengthy investigation of the meaning of the proposed terms, frustrated by the failure to reach their non-question-begging description, highlights the importance of refocussing the debate on the essence of the problem, which, once grasped in a way agreed by both parts of the debate, is further explored by means of conceptual clarification. A similar shift from meaning to essence is documented in the discussion about the therapeutic method, explained as a way to the discovery of the therapy to all diseases. The meanings of "disease" and "therapy" are a starting-point of an investigation of what disease is in

terms of its (empirically and/or rationally accessible) essence, and what it essentially involves to heal it. Such an investigation cannot dispense with natural-philosophical inquiry, physiological on the one hand, and pharmacological on the other, if it is to lead to a properly scientific, that is, causal-explanatory account of disease and its therapy. The third example, in turn, concerns the investigation of essence, specifically the question of why certain observable attributes belong to certain natural substances.

IV

The next chapter focusses on arguments Galen regards as non-demonstrative, but for which, nevertheless, he finds a place in scientific reasoning. They rely on premisses that do not qualify as "scientific", as they are not derived from

– and necessarily connected to – the essence of the problem at hand. Nevethless they do count as plausible or, perhaps in a better translation, persuasive. Two questions suggest themselves: what makes an argument non-scientific but persuasive, and what role do such arguments play in science? Looking at three arguments of this description in Galen's physiology – one about the function of the so-called glandular helpers, one about the function of breathing, and one about the location of the vegetative part of the soul –, I argue that they are based on inductions, i.e. generalizations from things *like* the subject matter of inquiry, or on analogies. As such they are vulnerable against counterexamples or equally plausible arguments to the contrary. Thus they function at best as provisional explanations, useful in particular when the properly scientific arguments have not been discovered yet.

V

In the last chapter, I turn to Galen's method of discovery in teleological arguments. In his monumental treatise on functional anatomy, *The Use of Parts*, Galen calls the object of this discovery χρεία: a word whose precise meaning is disputed, as it is variously being translated as "use", "usefulness", "function", "functionality", etc. Galen ascribes χρεία either (1) to small bodily parts, the small parts being those which contribute to the activities of bodily organs, or (2) to the activities of the organs by which the organs contribute to the life of the body as a whole. In *The Use of Parts* Galen focusses on the χρεία of the small parts. In other treatises, in particular *The Use of Breathing* and *The Use of Pulse*, he focusses on the χρεία of activities.

Exploring the notion of χρεία, I argue that, in Galen's view, χρεία belongs to bodily parts or activities (p/a) in virtue of them being for the sake of something else, namely, for the sake of an activity (A) which would not be possible or not as good without them. The discovery of the χρεία of p/a, then, presupposes the knowledge of two things: of A, and of the relevant attributes of p/a. Χρεία, then, is a connection between these two things. I discuss in detail how this connection is being found in Galen's physiological treatises. The method is someting like this: (1) You identify the activity (A) which would not be possible or not as good without the part/activity (p/a) in question. (2) You collect observations regarding the attributes of p/a. (3) You select those attributes of p/a that are causally relevant to the optimal performance of A. (4) You explain this causal relevance.

Comparing Galen with Aristotle, I argue that Galen's method is closely similar to Aristotle's procedure in *Parts of Animals*, and that the object of its discovery – χρεία – corresponds to the middle term of teleological demonstrations according to Aristotle's *Posterior Analytics* II 11.

In sum, the dissertation explores a representative sample of arguments that may be described as scientific on Galen's view, or at least as acceptable within a scientific discourse. By showing, in each case, how these various arguments proceed and what they have in common, I provide a multifaceted but coherent picture of Galen's method of solving problems in the area of natural philosophy. Roughly put, on Galen's view, problems in this area are solved by means of an orderly procedure which typically includes the semantic interpretation of the proposed terms and the search for a definition of the thing

sought, followed by the causal investigation of the thing sought, i.e., of the predicative relation under inquiry. In some examples discussed above, causal investigation is not included (the dialectical debate on whether hygiene belongs to medicine or to gymnastics), others do not include the semantic interpretation of the terms and the definition of the thing sought (the functional explanation of parts and activities). But all seem to be instances of the same method of inquiry, on Galen's lights at least, and one that Galen expounded in his *On Demonstration*. In short, the aim of the method is to discover demonstrable premisses appropriate to the problem from which a proposed conclusion could be deduced (or refuted). In other words, when searching for a proof, the researcher sets out to find a deductive chain between the terms of the proposed conclusion and relevant self-evident principles. Occasionally, when describing this method, Galen resort

to mathematical terminology, calling it "analysis". For him, this is more than a figure of speech. It expresses the deepest aspiration of his project of rational medicine: to solve problems in physiology, therapuetics, pharmacology, and related disciplines in a way that is as rigorous, reliable and immune from reasonable doubt as the art of geometry.

APPENDICES

The book has two appendices. The first contains a passage from Clement of Alexandria's *Liber logicus*, which seems to be the most extensive excerpt from Galen's *On Demonstration* available to us. The passage explains the initial phase of the search for the appropriate premisses, using the example of the problem, "whether the embryo is an animal or not".

The second appendix is concerned more broadly with the Christian reception of Galenic methodology. As I have shown in several articles, and in my Brill monograph, Galen played an important role for some early Christian writers in their attempt to set forth a theory of justification adapted to the specific needs of the Christian community. The early Christian use of Galen sheds light on an interesting topic in the history of ideas: the budding difference, in the 2nd c. A.D., between scientific and religious types of justification. I do not explore this topic in the present work. But, to provide a more complete picture of my research in this dissertation, I attach a chapter pointing in this direction. It explores the notion of intellectual independence in early Christian literature, and the attempt of the early Christian thinkers (some of them directly inspired by Galen) to incorporate this quintessentially philosophico-scientific notion into the

Christian framework. Simply put, the point at issue is the evidential basis of justification, which is contrued as a compelling and transformative power of an accepted tradition, rather than as a plain phenomenon of the mind or the senses.

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