
Blood, Sweat and Tears: The Changing Concepts of Physiology from Antiquity into Early Modern Europe edited by Manfred Horstmanshoff, Helen King, and Claus Zittel

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In their introduction, the editors of this immense volume affirm at once that their topic, the physiology of the human body, though known and seemingly banal, has been set aside for too long. Unlike human anatomy, which has for a long time been the subject of repeated publications and numerous detailed studies, this essential aspect of medicine has remained neglected in recent historiography, at least from antiquity to the early modern period. The reasons for this disdain are probably evident and some of them are evoked in the introduction: the necessarily abstract, even philosophical character of discussions surrounding it; the absence of significant discoveries as compared with advancements that exist in other medical fields; and the complicated relationship between observation and interpretation.

The book thus seeks to fill a void; yet it reaches beyond its own purpose. The volume as a whole—resulting from a colloquium held at the Netherlands Institute for Advanced Study in the Humanities and Social Sciences in April 2009—is founded on strong historical stances: foremost, the idea that it is appropriate to define physiology diachronically, given how this term—of ancient origin but intermittent usage—has seen its meaning change over time, just as the global framework it is supposed to cover has changed. In its most basic sense, physiology is indeed the study of the functions of the human body. It includes, but is not limited to, anatomy. By its very nature it covers the contributions of other sciences, particularly natural philosophy (what we would call biology today) and even pure philosophy in the case of the relationship between the body and the soul. The first question that the authors of this volume had to answer was, therefore: What is a strictly *medical* physiology from antiquity to the early modern period?

The second, more precise, question also stems from another stance—and rightly so, in my opinion—whose impact can be seen in the editors' choice of articles. It is the idea, asserted in the introduction, that the difficulty in distinguishing functions in the human body and in concretely identifying them led doctors to resort to numerous analogies or metaphors in physiological discourse, analogies and metaphors whose functions were often not only illustrative or didactic but also genuinely argumentative. This perspective incited the contributors of this volume to take a particular interest in medical writing, both as logical discourse and also, more generally, simply as discourse. This approach, which one could classify as literary—or at times linguistic—can be found in many articles written by historians and has resulted in the integration of multiple texts that are explicitly focused on literary works. *Blood, Sweat and Tears* is thus situated in a rich historiographic movement, aimed not at superficial interdisciplinarity but at the analysis of medical discourse as a genre, with writing styles, rational structures, and limits.

These significant orientations, of course, do not exhaust the richness of this book, which consists of 28 articles presented in five parts of unequal size. Before highlighting certain aspects that seemed particularly interesting to me, and before attempting an impossible summary, it seems essential to present them one after the other, though without necessarily respecting their order.

The first part, entitled 'History of Physiology in Context: Concepts, Metaphors, Analogies', concerns specifically the two aforementioned questions: the difficult definition of physiology and the question of its writing. Vivian Nutton addresses the term 'physiology' itself, whose use he has found among the Greeks but whose meaning he shows is linked to the study of nature in general; above all, he insists on the fact that during the Renaissance, *physiologia* does not perfectly align with how we would define this term. Anatomy in particular is just a part of it and is not clearly distinguished: according to Nutton, it is not until roughly 1850 that we can distinguish two distinct domains.

In her analysis of the analogies and metaphors used to explain Earth and the cosmos, Liba Taub notes that many of them are linked to the functions of the human body, such as digestion, leading Epicurus and Lucretius, though denying its animation, to compare the cosmos to a living being. This comparison of animate and inanimate material turns out to be quite interesting and we do not know if the analogy simply held an illustrative role or if it leaned towards a logical explanation. Later in the volume we can find the

same type of analysis in the article by Fabio Tutrone, who is able to identify in Lucretius' *De rerum natura* a true physiology, whose influence is felt until the Renaissance.

The articles by Elizabeth Craik and Michael McVaugh treat the functioning of certain organs from antiquity to the beginning of the early modern period. Craik, following the reception of the Hippocratic treatise *On Glands*, notes that the text, though well known, has been nonetheless overlooked, which she explains by its lack of humoral theory and the inclusion of a flux theory, which, together, present effectively the opposite of what was in fashion during the early modern period. McVaugh devotes his article to the description of the kidney, starting from Galen and going on to analyze debates from the 13th to the 17th century. He notes a tension between two types of explanations, mechanical and functional: Galen and others after him try to explain the functioning of the organ through a purely mechanical description but this explanation must end when it is no longer sufficient; then come the faculties, and more exactly the attractive faculty, as a principle of explanation.

To explain the global functioning of the human body, recourse to analogies, as we have seen, is another method. Sergius Kodera explores the use of distillation as a model, which, according to him, starting in the Renaissance, begins to compete with the more classic Aristotelian model of coction. Sabine Kalf, following many other researchers, shows the endurance in the 17th century of the link between physiology and political theory through the use of illness as a metaphor for conflict, particularly in the works of Campanella and Bacon. These two cases, quite opposite in their impact—the distillation model is limited to a few authors, whereas the comparison between the political body and the human body has been a continuous classic since antiquity—show the relevance of an approach combining literature and history, even if the authors do not have the room here to develop their thoughts as much as they would like to.

In his article on the aging process, Daniel Schäfer also demonstrates the interest in following a group of analogies over the course of time in order to piece together the modes of argumentation specific to medicine. As such, he notices that authors use comparisons between the effects of time on the human body and the course of the seasons, the functioning of a lamp, and so forth. This work allows him to highlight the transition, starting around

1600, towards a more objective and less metaphorical knowledge, allowing a slow evolution of argumentative methods used in science.

Rina Knoeff's article attempts to show the importance of the physiology of the brain and nerves in the work of Herman Boerhaave. If he situates himself voluntarily and explicitly in the continuity of ancient authors and, particularly, Hippocrates, Boerhaave makes consequential shifts in his physiology. Although he conserves the Hippocratic method focused on observation, he integrates the ideas of William Harvey concerning circulation and the latest anatomical advances into the global framework of the 'old' physiology. Here, these discoveries lead not to a complete revolution but rather to a slow evolution.

The last two contributions to this part concern the links between physiology and philosophy in the 18th century, through the thoughts of David Hume (Tamàs Demeter's article) and Jacques Diderot (Tomas Macsotay's article). In the first case, it appears that the explanation of the functioning of the human body by the Scottish philosopher owes less to a Newtonian, mechanical point of view than to the vitalist vision of Scottish Enlightenment thinkers, particularly the chemistry of William Cullen. Demeter demonstrates the existing links between the thinker and the medical school of Edinburgh from the second half of the century, which allow Hume to understand the mind by laying out the fundamental principles taken from the phenomena of interconnection between perceptions. Macsotay notices that Diderot also abandons the mechanical explanation for a vitalist interpretation, relying on the relationship between medicine and art for the philosopher: it is as such that Diderot criticizes a sculpture of Falconet (1774), studying the physiology of pain.

This long first part thus shows the interest of a global study of physiology through the analysis of medical discourse and the shapes it takes. The following three parts are dedicated to more pointed approaches, focusing on the three elements of the title: blood, sweat, and tears. Logically, given the importance of the subject, the part on blood is the longest, containing seven articles. The first two show that the examination of blood, though probably frequent during a time when bloodletting was one of the most common methods of medical therapy, remains nevertheless incomplete: Hans L. Haak remarks that descriptions of blood outside of the body are particularly uncommon in medical literature. The article written collectively by Barbara Baert, Liesbet Kusters, and Emma Sidgwick addresses the iconography of the

healing of a bleeding woman as described by the Gospels; however, although representations of the scene are depicted across many media—paintings but also gems and amulets—blood is never directly shown.

Three articles remain focused on fundamental physiological questions linked to blood. Rainer Brömer touches upon what has been for decades an extremely debated topic, namely the reception of Ibn al-Nafis' 13th-century hypothesis on the passage of blood between the two ventricles of the heart by the lungs and not by the central wall of the organ. He insists, following the recent work of Nahyan Fancy, on the necessity of re-situating Ibn al-Nafis in the larger context of the Islamic world at the time; most importantly, he shows that the Damascene doctor's proposal was not forgotten and that, on the contrary, it was well known in the Muslim world during the Ottoman era, citing as an example the illustrated treatise on anatomy by the Ottoman doctor İtaki (1632) or the works of Ḥassan al-'Aṭṭâr (ca 1801).

Karine van't Land is interested in the division of spermatic members (theoretically from male sperm: bones, nerves, arteries, and so on) and blood members (from menstrual blood, particularly flesh), which originates in antiquity and presented problems for medieval authors who attempted to connect these distinctions at once to the question of the origin of the embryo, the aging process, and the difference between men and women.

In keeping with the questions raised by this last point, Barbara Orland focuses on the common analogy between blood and breast milk, which represented blood as a red milk and milk as a white blood. Such an idea was commonplace until the 19th century. Despite being called into question in the 17th century, notably with the emergence of the idea, based on experimental physiology, that milk came from chyle, the strength of this analogy explains the survival of this connection even among educated doctors well after its theoretical questioning.

These three contributions show the vigor and richness of debates provoked by certain impasses in physiological theory inherited from antiquity. The last two articles of this part discuss the relationships between medicine and other fields, which are obvious when it comes to the topic of blood, a humor that has always been characterized by implicit and explicit connotations. Jacomien Prins notes sources linking music and pulse in Marsilio Ficino's commentary of the *Timaeus*, not only from his description but also from a purely therapeutic point of view: musical harmony can, according to Ficino and

some of his predecessors (notably Avicenna), constitute a real remedy. Catrien Santing points to the increasing proximity between medicine and religion on the question of blood, showing that the 16th-century doctors Lemnius and Cesalpino tended to spiritualize blood, linking it to the *spiritus universalis*.

The third part, with only three articles, concerns sweat and skin. It opens with a precise and complete article by Valeria Gavrylenko on the notion of skin in Homeric poetry, illustrating the editors' aim of a multidisciplinary approach. Based on exhaustive lexical research and set in comparison to the vocabulary used by ancient Greek doctors and philosophers, she reveals the absence of a true concept of human skin, since the terms used are often vague or linked to animals, whereas the boundaries of the body seem unclear and allow for interpenetrations with the environment.

Michael Stolberg proposes a useful and clear panorama of the conceptualization of sweat between 1500 and 1800, addressing medical discussions along the continuity of Galen's positions as well as popular representations whose traces we can find in the accepted notions surrounding the therapeutic utility of perspiration: sweat has been charged with positive and negative connotations since ancient times both in scholarly thought and popular wisdom.

Mieneke te Hennepe's article, somewhat reducing the focus, concentrates on the long 17th century, examining the role of the microscope in the reevaluation of the role and functioning of skin. The dominant metaphor until then, the fishing net, slowly but surely concedes its place to the more precise image of a skin pierced with a multitude of pores and comprised of many glands. However, the greatest precision in the description does not lead to a new practice: as Stolberg demonstrates, representations and theory remain remarkably stable despite discoveries.

In the fourth part, three articles examine the subject of eyes and tears. Véronique Boudon-Millot makes a clear and synoptic point about Galen's physiological theory, developed in many parts of his work and often somewhat unclear, by focusing on argumentation: Galen, who attributes an important place to the role of *pneuma* in the process of vision, affirms that it is impossible to understand it *via* dissection and recognized that it can only lead to a plausible theory, one that is probable but not certain.

Katrien Vanagt, moving forward several centuries in time, shows that the problems and questions that Galen addressed remained relevant until the

17th century but that the emergence of experimental devices (such as the *camera obscura*, which she examines in her discussion of V. F. Plemius' treatise *Ophthalmographia*), allowed for evolutions that were not always unequivocal but which depended on the framework in which these discoveries were integrated, a theoretical framework generally presented as Galenic but sometimes, when examined more closely, quite original.

Finally, Frank W. Stahnisch addresses the example of the illness that affected Herder, whose lachrymal ducts were blocked. Having studied medicine himself as well as having undergone numerous surgical operations, Herder takes a precise look at the role of tears and, as much a physiologist and theologian as a philosopher, declares himself a 'physiologist of the soul and of the human body'.

The fifth and final part arrives at the fundamental point, nearly always present in the preceding articles: the question of the relationship between body and soul. Julius Rocca returns to the question of *pneuma*, showing from a long study the conditions of the emergence of a 'natural pneuma', a type of *pneuma* that was only mentioned incidentally by Galen, who did not consider it useful. The notion was introduced when Greek texts were being translated into Arabic, above all for the sake of being coherent; and though natural *pneuma* was hardly needed to explain the functioning of the body, doctors tried to find a need for it over the course of the medieval and modern periods.

Next, Marlen Bidwell-Steiner compares two 16th-century authors, Telesio and Olivia Sabuco, attempting to show that the latter was influenced by the radical simplification of Aristotelianism by the former. Sabuco, in *Nueva filosofia de la naturaleza del hombre* (1587), undertakes nonetheless an even larger shift, proposing a gynocentric model of the world or at least an egalitarian model of men and women.

Marion A. Wells then addresses the links between maternal voice and melancholy in Webster's *Duchesse de Malfi* (1614), showing the influence and the limits of medical theories on literature in a particular example—involving emotions—and echoing issues that Macsotay raises in his article on Diderot.

Finally, Diana Stanciu explores the concept of 'plastic nature' set out by Ralph Cudworth in *True Intellectual System of the Universe* (1678). This sometimes-vague concept, introduced as a mediator between the corporeal and incorporeal, is re-situated in its textual (notably Aristotle's vegetative soul)

but also polemic and contemporary context (the struggle against Descartes' ideas). The point here is to see that the dynamic reconstructions of concepts are sometimes unfinished and incomplete, whether due to the difficulty of ancient sources or a deliberate wish not to linger on the coherence of choices—a reality that the historian of science, bound to respect the principle of charity, sometimes has difficulty accepting.

This long enumeration of articles will possibly have made us lose track of the larger questions that permeate *Blood, Sweat and Tears*. Let us try to summarize. First, this work insists on the importance attributed to physiology itself: despite the difficulty of certain subjects, despite the aridity of several themes, despite the apparent absence of a scientific revolution during the period in question, physiology constitutes the base upon which the entirety of medical production is built until the heart of the 19th century. The subject being partially new, one can particularly appreciate the synoptic presentation of lesser-explored topics, such as certain organs (the kidneys), certain functions (sight), or even certain bodily productions (sweat). These elements make *Blood, Sweat and Tears* an indispensable reference. But the volume exceeds this aim in indicating the methodology and questions of future research by creating a fundamental space for argumentative methods used, by considering methodological contributions from other disciplines such as literature, by studying the relationships between medical discourse and other productions, learned or not, and, finally, by not limiting itself to a single period and covering an impressive continuum from antiquity to the 19th century.

We can nevertheless express a few regrets. If the accumulation of articles allows for a multitude of points of view and generally enriches our overview, it hinders a complete, if quite instructive, reading and most likely condemns the book to be seen primarily as a juxtaposition of independent contributions. To facilitate the reader's comprehension of the unity behind this diversity, a substantial conclusion could have helped, though this idea may be met with rejection, perhaps rightly so, for the reason that it would have added even further to the size of the volume. The other reproaches (if we can truly use that term) are more isolated. Obviously, as in all undertakings of this nature, certain articles seem less interesting or less integrated in the general aims and questions of the book. However, these are rare exceptions and we must be thankful to the editors who chose the authors and oriented their contributions. At times, we might also point to the use of images, which embellish certain

articles but serve a purely illustrative purpose without being subject to analysis. Of course, this is not the case for all of the contributions but, when it is, the images lose their interest and frustrate the reader who would like to see them discussed. Lastly, we might note a slight overrepresentation of the early modern period (15th–18th centuries) mostly for certain themes, though this is perhaps inevitable in an undertaking of this magnitude.

These few remarks should not distract from the quality of the book. Its ambition, characterized by an interdisciplinary research approach and the study of a selection of strong issues over a significant period of time, makes it a fundamental work on the topic—and one which will surely encourage new research.