

**THE SOUL  
IS AN  
OCTOPUS**  
ANCIENT IDEAS  
OF LIFE  
AND THE  
BODY

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edition | topoi



Berliner  
Medizinhistorisches  
Museum der Charité



**THE SOUL IS AN OCTOPUS**

**BERLINER MEDIZINHISTORISCHES MUSEUM DER CHARITÉ  
EXCELLENCE CLUSTER TOPOI**

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## Preface

It is always a challenge for scholars to convey historical and philosophical ideas and concepts to the broader public. The difficulty, of course, lies in conveying concepts and ideas correctly and precisely, while at the same time presenting them in a comprehensible and captivating manner. The research group ‘Mapping Body and Soul’ of the Excellence Cluster Topoi, together with the Alexander von Humboldt Professorship of Classics and History of Science at Humboldt-Universität zu Berlin and the Berlin Museum of Medical History at the Charité, deserve to be commended for having taken up this challenge. They have presented their findings on how the body and the soul are connected in a highly interesting exhibition and a stunning exhibition catalogue. ☉ The subject is complex from a historical as well as a methodological point of view, even for today’s scholars. Philosophers have been engaged in dialogic arguments on the relationship between the body and the soul – in almost constantly recurring variations – since antiquity. For some, the body is the basis of all human abilities and sensitivities; according to this view, all questions concerning life and death revolve around the body. For others, however, it is the soul that gives life to the body. ☉ Which of these two elements causes which manifestations of life? Where does the soul reside? Is it distributed throughout the body? Can it also be found outside the body? What causes our arms and legs to move – solely the muscles? But then what causes our muscles to move? If it is only through the body that we move, how then can we voluntarily move a part of our body or refrain from moving it? It is fascinating to find that all these questions were posed in antiquity and equally enthralling to follow, in the exhibition and the accompanying catalogue, doctors of antiquity as they discover how the human body works and then apply this knowledge to the healing of illnesses and diseases. ☉ All the basic elements needed to understand ancient and modern concepts of the body and the soul can be found in this convincing exhibition and its remarkable catalogue. The pictorial representations that guide one through the exhibition and the book are much more than just illustrations: they capture evocative moments in the lives of ensouled bodies – moments that invite us to marvel at the miracle and mystery-of life.

*Berlin, May 2016*

**GERD GRASSHOFF AND MICHAEL MEYER**

*Directors of the Excellence Cluster Topoi – The Formation and Transformation of Space and Knowledge in Ancient Civilizations*



# Mapping Body and Soul

## The Making of an Exhibition

BY PHILIP VAN DER EIJK, THOMAS SCHNALKE  
AND UTA KORNMEIER

The exhibition ‘The Soul is an Octopus. Ancient ideas of life and the body’ is devoted to ancient concepts of the interaction between mind and body. It focuses on attempts made by Greek and Roman doctors and philosophers at localising the soul, its functions and its failings, at specific places on the ‘map’ of the human body. The exhibition is the result of a collaborative project between three partners:

- the research group *Mapping Body and Soul* of the Berlin Excellence Cluster *Topoi – The Formation and Transformation of Space and Knowledge in Ancient Civilizations*;
- the research group *Medicine of the Mind, Philosophy of the Body: Discourses of Health and Well-Being in the Ancient World* of the Alexander von Humboldt Professorship in Classics and History of Science, based at Humboldt-Universität zu Berlin; and
- the Museum of Medical History at Berlin’s medical school, the Charité.

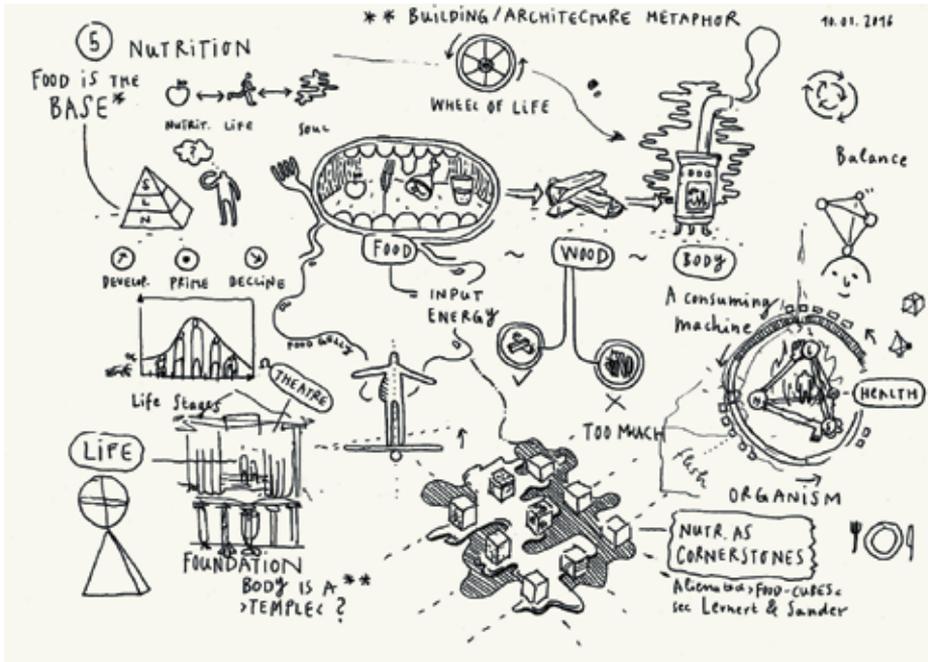
**Mapping Body and Soul** Our research is situated on the interface between the history of medicine and philosophy from the Graeco-Roman world to the modern era. We are looking at ancient ideas of the soul, how it is related to the body, what bodily factors are involved in the soul’s activities and where in the body these activities are located. Furthermore, we follow the ways in which these ancient ideas influenced later developments in medieval philosophy and medicine, in Islamic thought and in the early modern period.

The spatial mapping of the body and the soul, their respective functions and the diseases affecting them was part of the philosophical and medical exploration of intra-corporeal spaces that had started in the fifth century BCE. Ancient theories and practices of finding out about these internal spaces and processes were based on empirical observation and dissection as well as on diagnostic methods of inference from signs and symptoms. We are studying these methods and their theoretical foundations, ranging from Platonic and Aristotelian metaphysics and psychology through to the materialist ideas of the Epicureans and Stoics, with Galen and the medical Pneumatists taking a subtle intermediate position.

**Health and Well-Being, Sanity and Insanity** In our research, we are also examining the way people in the ancient world defined health, physical as well as mental, how they tried to achieve it and enhance their quality of life, and how they reacted when things went wrong: what did the Greeks and Romans do when confronted with physical and mental illness? And to whom did they turn for expert advice, guidance, diagnosis and treatment? To doctors, or philosophers, or miracle healers, or to the gods? This was no clear-cut issue, for in the ancient world the boundaries between ‘scientific’ medicine, philosophy and religion were often vague, leaving much room for dialogue, overlap, but also for rivalry and disagreement. This is understandable for, like today, ‘health’ in antiquity was not a monolithic concept, it admitted different and sometimes conflicting understandings and definitions, ranging from the absence of disease (however defined) to mental well-being and happiness; and health management in the ancient world varied from extreme forms of asceticism to more harmonious kinds of a ‘balanced’ lifestyle. Likewise, there were different opinions in Graeco-Roman society when it came to the question of who decides, and by what authority, whether someone was actually healthy or ill – the patient or the doctor, the individual or the society, the philosopher or the priest, someone’s subjective experience or ‘scientific’ data. No aspect of health, ill health and disability was more surrounded by such controversy than the mental domain, where competing modes of management and treatment were developed, ranging from aggressive drug therapy, gentle dietetic lifestyle patterns through to various modes of counselling and what we would call psychotherapy.

**Antiquity Intervening** In the exhibition ‘The Soul is an Octopus’, we present some of the results of our ongoing research to a wider audience. We do so by ‘intervening’ into the permanent exhibition of the Museum of Medical History at the Charité. The site of this intervention is the central exhibition space housing the historical specimen collection of the Berlin physician and

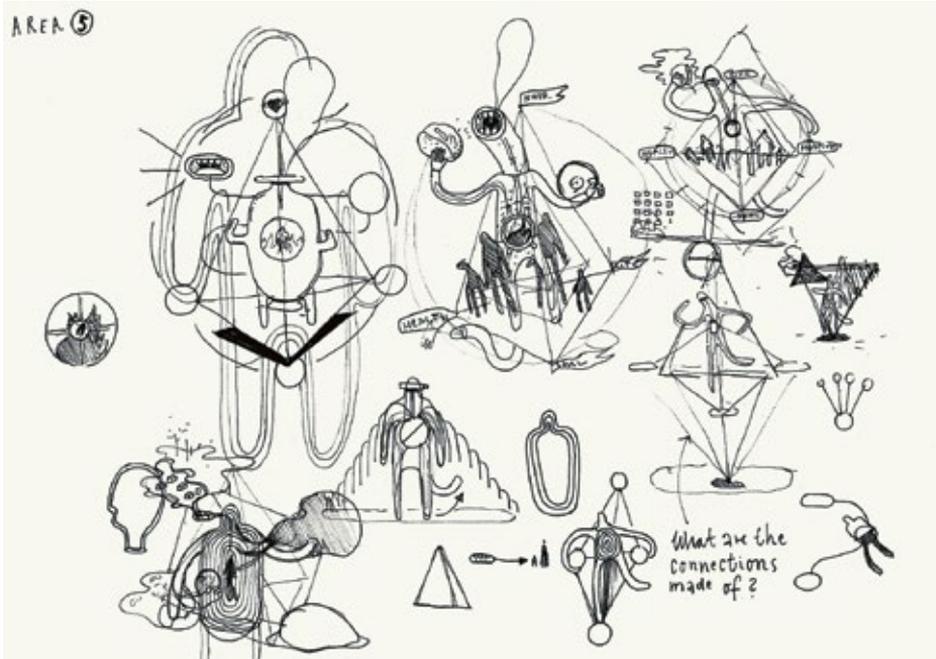
pathologist Rudolf Virchow. With his huge collection, presented since 1899 in this 'Pathology Museum', Virchow intended to create a spatialised 'map' of the human body showing all diseases known at the time. He wanted to visualise clearly the typical signs of the various diseases in a single organ or defined bodily structure. By grouping his specimens in specific units he tried to show the distinct developmental processes characteristic to each disease, thus aiming at expanding the human body to an open space that would be physically and visually accessible in all its details. ◉ The multitude of specimens still dominates this exhibition space today. At first glance, the visitor might get the impression that here (s)he may learn everything there is to know concerning the body, what constitutes human life and its risks. Looking closer, however, one might wonder whether this is actually the case. Walking in and out between the showcases, we could equally develop the opinion that we do not learn anything essential at all: nothing refers to actual life, or the living and breathing human beings from which the individual specimens on the shelves came; we find no reference to their worries and fears, their moments of joy and happiness, nothing about what affected and moved them, how they grew up and developed into fully-formed human beings and, especially, nothing about the hours of unease and suffering they experienced before they ended up here. We learn nothing that connects any of the visible objects with a living person, in short: we learn nothing about the soul. ◉ Every now and then, the Museum of Medical History at the Charité organises 'interventions', i.e. temporary exhibitions on a specific theme that complement what is already on display. The curators responsible for these 'interventions' are especially interested in the differences, the 'otherness' of the permanent presentation's main narrative, and the absent perspectives or dimensions. Their aim is to initiate an unexpected, open, and hopefully productive dialogue between the existing displays and this new, externally introduced content. ◉ The exhibition 'The Soul is an Octopus' reflects on what determines human life as a dynamic and vitalising element: the soul. And it provides the experience of an anachronistic encounter: Virchow's arrangement of specimens, conceptualised and realised around the year 1900, on the one hand, and ideas, notions, and interpretations on the soul and its features as they were developed and documented by philosophers and physicians some 2,000 years earlier. ◉ In this way, we are trying to connect the distant and the more recent medical past in order to create a dialogue between ancient and modern ways of looking at the human organism, both in its flourishing state and in the depths of its suffering. This dialogue is helped by the fact that medicine today has its origins in the medical theories developed by the ancient Greeks and Romans. The views of Hippocrates, Galen and other Greek and Roman doctors are fundamental to the ways we think and speak



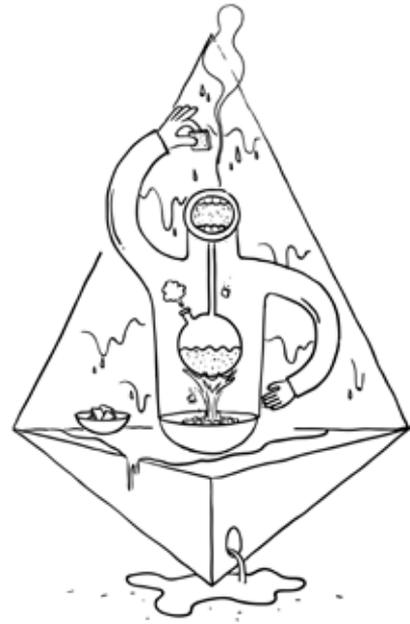
**Christoph Geiger** Developing a visual translation for the intervention area Nutrition: visual brainstorming, bringing ideas to paper

about health and disease, sanity and insanity today; and philosophers such as Plato, Aristotle and the Stoics laid the basis for our views on body, soul and life.

**Curating Ancient Ideas of the Body, Soul and Life** Curating this exhibition, we were faced with the challenge to integrate abstract ideas, which are predominantly known to us by written texts, into a room full of very concrete objects that speak to the visitor on a literally visceral level. Relatively few archaeological objects from the realm of ancient medicine have survived, and those that have are not always particularly meaningful to the layperson. Moreover, they certainly do not illustrate the highly sophisticated intellectual content of the ancient debates on the parts and functions of body and soul. Thus, we decided to use actual archaeological artefacts sparingly; they were introduced only when they helped to present the knowledge the ancients had of the in- and outside of the body, when they testified to the high level of practical



skill with which ancient doctors examined and manipulated the body, and when we thought they brought the people from the ancient world closer to us on the other side of the glass case. ◉ Of course, there are a number of medieval and Renaissance illustrations and representations of ancient ideas that could provide attractive visual material on earlier philosophical and medical debates. However, these later illustrations are somebody else's later interpretations of the ancient writings; these further developments of the original ideas would add another layer of thought in need of explanation. But what if we provided these illustrations ourselves, if they represented *our* academically informed, entirely contemporary interpretations? ◉ To this end, we needed a 'visual translator', who would be able to translate our modern understanding of those ancient ideas into images and who would work with the group of researchers that developed the content for this exhibition. For this we approached Christoph Geiger whose task it became to discover the essence of



what the researchers wanted to convey, and to express it in a strong, clear and, most importantly, new visual language. The purpose was not to illustrate the texts, nor to supplement them with additional information, but to capture and visualise the main issues in a way that visitors would want to follow. Word and image had to balance each other: while the images were meant to make visitors curious to read the texts, the texts would reveal more fully what was presented in the images, and this in turn would make the texts more easily accessible. ☉ In the first phase, Christoph Geiger familiarised himself with the ideas and details of each of the ten intervention areas, and transformed his impressions into several sketches. He then met with the researchers and the curator to discuss these sketches. In these discussions, we tried to balance academic precision with the need for concrete visual decisions and the ambition to create accessible and appealing images. Collaboratively, we tried to figure out how best to present the content in a way that was as accurate as possible



The first full sketch defines the overall elements of the illustration, before the visual concept is refined, and detail and colour added.

and at the same time visually attractive. ◉ Christoph Geiger then developed the key elements into bigger images, and we had long discussions of what was seen in each image, and how all images related to one another. This was an important phase of the process as we now started to concentrate less on *what* was represented, than on *how* it was represented. Suddenly the features of a line in a drawing became significant, how one line was related to another, whether it should be dark or light or dotted. How detailed and colourful should the images be in the end, and what colour scheme should be adopted? It was still a long way before everybody's opinions, thoughts and concerns had been reconciled or at least addressed, but we felt the main goal was eventually achieved: the visual translation of highly abstract and intellectual content into images that we hope will easily draw people into the world of ancient medicine and the philosophy of body and soul.

# BODY SOUL AND LIFE

BY PHILIP VAN DER EIJK

## IN ANCIENT MEDICINE

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Medicine today has its origins in the medical theories developed by the ancient Greeks and Romans. Doctors and philosophers in antiquity identified the physical body as the space in which life in all its various manifestations was located and originated. They used the word ‘soul’ (*psychê*) to refer to the life force inspiring, informing and energising the organism. This concept of an organic connection between soul and body was a major departure from the earlier Homeric view, according to which the soul was a separate entity that entered the body from outside.



**SOUL AND LIFE** It was the soul that provided living beings with the structures and functions enabling them to live, grow, develop and exercise the full range of their natural capacities. The soul was believed to be responsible for cognition, emotion and locomotion, and in humans also for rational thought, deliberation and decision. And the ‘ruling part of the soul’, human reason, was believed to be located somewhere in a central part of the body, from which it controlled and co-ordinated the organism’s activities. Some ancient philosophers, such as Aristotle, even regarded functions such as nutrition, growth and reproduction as manifestations of the soul, as they were, literally speaking, of vital interest to the organism’s existence. And some medical writers, such as Galen, while distinguishing ‘psychic’ functions in the strict sense (such

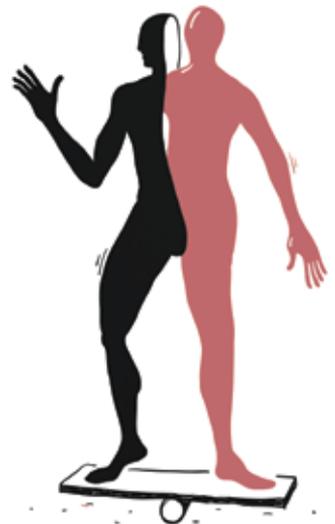
as cognition, decision and action) from 'vital' or 'natural' functions (such as pulsation and growth), nevertheless attributed all of them to a mysterious, intelligent substance called *pneuma*, 'breath' or 'spirit', which became the carrier of all life forces in the body.

**THE BODY AS INSTRUMENT** Yet in order for the soul to operate, it needed a body that was suitable to serve as its vehicle or instrument. The body had to consist of the right material, size and structure, and to be in a state of balance and stability of its constituent parts. And the body had to be capable of exercising a large number of functions, both in response to specific, conscious commands of the soul, as in action and locomotion, but also autonomously and independent of conscious decisions, as in digestion or respiration.

**COMMUNICATION BETWEEN SOUL AND BODY** In order for the body to carry out the instructions of the soul, or to pass on information from the sense-organs to the central commanding centre, body and soul needed to be able to communicate with each other. In order for this communication to be effective, a well-functioning network of information channels and receivers had to be in place; and each bodily part involved in this network had to 'know' what it was supposed to do. In third-century BCE Alexandria, Greek medical scientists discovered the body's nervous system and assigned to it the co-ordinating functions that had hitherto been attributed to the blood vessels, the ligaments and tendons.

### **HEALTH, DISEASE AND MEDICINE OF THE BODY**

Thus good bodily health was a crucial requirement in order for the soul to be able to exercise its functions. When the body was suffering from illness and pain, or when specific parts of the body were in a bad shape, this also affected the soul's well-being. Medicine, as the discipline that preserves and restores bodily health, was therefore vital also for the health of the soul. The medical doctor Galen was a fervent advocate of this position, tracing his views back to earlier medical authorities such as Hippocrates and Diocles. These doctors developed elaborate rules for the prevention of disease and for the preservation and enhancement of health. This system of rules was called 'dietetics', the part of medicine that was concerned with lifestyle. Dietetics comprised not just eating



and drinking but also fitness and wellness, working and leisure: its aim was to find the right balance between the various components of human life, thus enabling people to achieve a high quality of life. This balance was believed to differ according to people's individual living patterns, and thus dietetics developed into a refined set of guidelines aiming at each person's bodily and mental flourishing.

**HEALTH, DISEASE AND MEDICINE OF THE SOUL** Yet the soul itself, too, was believed to be subject to health and disease, and to inner conflict between its various 'parts'. Mental health was considered vital for good functioning of the organism as a whole. But diseases of the mind could disturb the soul's internal balance and stability, and jeopardise its connection with the rest of the body. For when the ruling part of the soul was in disarray, the body was deprived of rational direction and left to its own devices. Maintenance of the soul's health and stability was therefore considered essential also for the good functioning of the body. This was the joint responsibility of medicine and of philosophy, which was often referred to as the 'medicine of the mind'. Hence philosophers such as Plato, Aristotle and the Stoics are relevant to medicine as well, as their teachings on the soul, on happiness, morality and the emotions, had repercussions also on bodily health and well-being. Doctors such as Hippocrates and Galen also developed techniques to diagnose and cure sickness of the soul, either through dietetics and medication or by psychotherapeutic means such as counselling and early precursors of what is today referred to as cognitive behavioural therapy.



**MAPPING BODY AND SOUL** In their ideas about mental and physical health, many ancient doctors and philosophers were engaged in 'mapping body and soul': they divided the body into different areas and parts, and located diseases in specific bodily regions or constituents, often naming them after the part of the body they believed to be affected. Many of these names still survive in today's medicine, such as *hepatitis* or *pneumonia*, named after the Greek words for liver and lung. Diseases of specific psychological functions were often named after the bodily parts that were believed to be affected, for example, *hypochondria* (a disease affecting the imagination whose origin was believed to be located in the region 'below the ribs') or after the bodily substance that was regarded as the causing agent, such as *melancholia*,

named after the Greek word for black bile, one of the humours that ancient medicine believed to reside in the body. Likewise, they tried to locate the various functions and parts of the soul in specific bodily parts or substances. Thus Plato located reason in the head, will in the thorax and emotions in the liver. The Stoics compared the soul to an octopus, with its eight legs representing the five senses, speech, reproduction and thought.

**DIAGNOSIS AND DISSECTION** Knowledge of internal anatomy was limited in the ancient world, and therefore many ancient doctors and philosophers tried to infer the place where specific psychological functions might be located on the basis of externally visible pathological manifestations. Thus the observation that traumatic injury to the rear part of the head was followed by memory failure led to the conclusion that memory was located in the posterior part of the brain. Some doctors, however, tried to substantiate their claims to localisation by means of invasive surgery, dissection and even vivisection. Thus Galen undertook to demonstrate the cognitive supremacy of the brain and the nerves by means of animal vivisection on a large scale.

**ARGUMENT AND DISAGREEMENT** Yet the ancients were by no means unanimous on all these points. Greek and Roman medicine developed in an atmosphere of openness and critical debate, which was an important motor for the spread of new ideas. Doctors and philosophers disagreed sharply on crucial questions such as the place of the ruling part of the soul, which was believed by some to be located in the brain, by others in the heart, or in the forehead between the eyebrows, or in the diaphragm, or in the blood, or in the *pneuma*, the airy substance that was believed to fill the brain and the nerves and to be the carrier of cognitive and motor information. Even the very tendency to localise physiological function and pathological dysfunction in specific parts of the body was disputed. Some ancient doctors cast doubt on the assumption that all functions and diseases could be localised; they criticised the diagnostic methods by which others tried to prove their points and the therapeutic inferences that were drawn from this. They argued that certain psychological functions cannot be isolated in specific parts of the body but operate systemically, with a large number of bodily parts, substances and processes being involved. They also claimed that many diseases affect the whole body, that health is a matter of the entire body functioning well and that treatment should encompass the complete body rather than parts in isolation.

**LOCALISATION IN ANTIQUITY AND TODAY** These debates in ancient Greek and Roman medicine closely resemble discussions in today's medicine.

In brain science, disagreement still surrounds questions about the extent to which specific cognitive functions can be located in specific sections of the brain. Disagreement also surrounds the significance of visual data gained by neuro-imaging techniques. For what exactly does it mean when, in certain states of emotion or cognitive activity, certain areas of the brain light up in a brain scan? There is often room for more than one interpretation here. © The ancient debates also remind us of the tension, often perceived in today's medical care, between specialisation and generalism, or between fragmentation and holism. Many diagnostic and therapeutic approaches in today's medicine concentrate on specific areas of the body. But it is often felt that in these localised approaches, insufficient attention is being paid to the 'whole', to the unity of the human organism and to the close connections between body and soul.

**ARISTOTLE** On the instruments of the soul **All natural bodies are instruments of the soul. This is true of the bodies of plants as well as animals. This shows that they exist for the soul.**

**THE STOICS** The parts of the soul are pneuma stretching through the body like the tentacles of an octopus **The Stoics say that it is the highest part of the soul, the ruling part, which produces mental representations and assent, perceptions and impulses. They call it 'reasoning'. From this, the *hêgemonikon*, there are seven parts of the soul which have grown out of it and stretch out to the body, just like the tentacles of the octopus. Of the seven parts of the soul, five are the faculties of sensation: sight, smell, hearing, taste and touch. Of these, sight is *pneuma* extending out from the *hêgemonikon* as far as the eyes; hearing is *pneuma* extending out from the *hêgemonikon* as far as the ears; smell is *pneuma* extended from the *hêgemonikon* as far as the nostrils; taste is *pneuma* extended from the *hêgemonikon* as far as the tongue; and touch is *pneuma* extended from the *hêgemonikon* as far as the surfaces of the objects with which we come into tactile contact. Of the rest, one is called seed [reproductive faculty], and this is also *pneuma*, extended from the *hêgemonikon* as far as the testicles. And 'vocalisation' [...] which they also call 'voice', is *pneuma* extended from the *hêgemonikon* as far as the throat, tongue, and appropriate organs.**



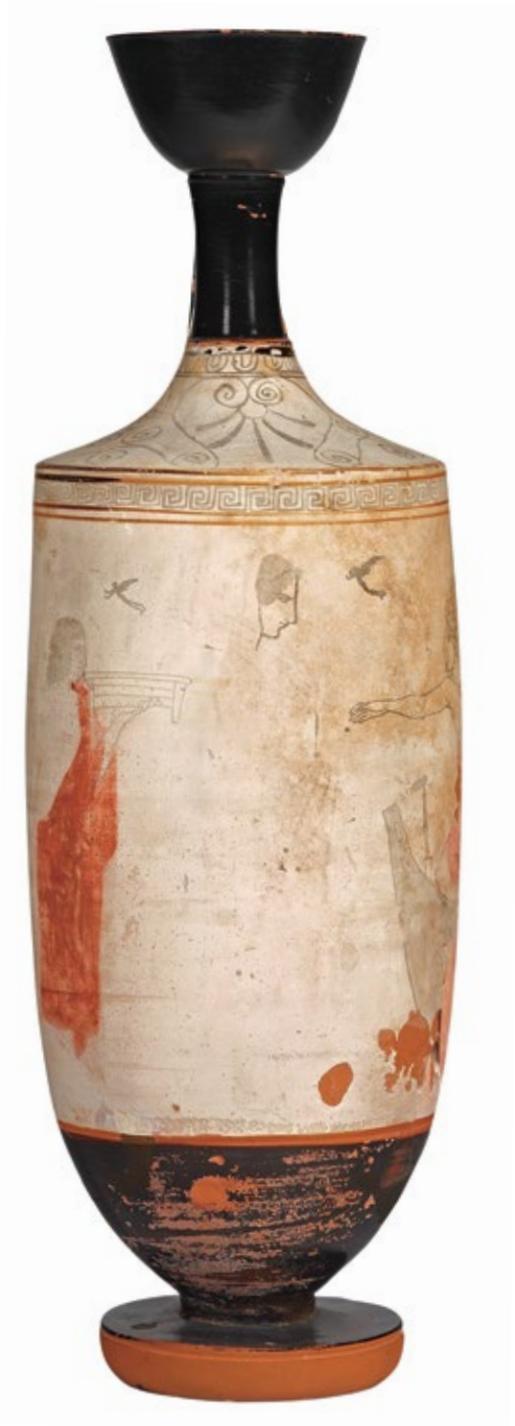
**Water jug with octopus and fish, ca 500 BCE** The Stoics compared the different functions of the soul to the arms of an octopus, an animal often seen in the waters of the Mediterranean coast. It was a popular decorative element in the Cretan-Mycenaean period (2800–1200 BCE). Later it featured on coins from cities close to the sea and on ceramic

vessels, its many arms providing plenty of opportunities for visually interesting stylisation. Despite their simple body structure, octopuses are highly intelligent, which made them ideal model organisms for early psychologists and neuro-scientists; in the 1940s to 60s, they were used especially for studying the classic 'psychic' functions of memory and learning.



**HOMER** What happens to the soul after death This is the appointed way with mortals when one dies. For the sinews no longer hold the flesh and the bones together, but the strong might of blazing fire destroys these, as soon as the life leaves the white bones, and the spirit [=soul], like a dream, flies away, and hovers to and fro.

**Charon fetches a soul for the underworld, oil flask, attributed to the so-called Sabouroff Painter, ca 440 BCE** Around 850 BCE, Homer describes the *psychê* (soul) as a breath-like body within the material body. The latter dies as soon as the *psychê* leaves it, while the soul itself lives on as an *eidolon* (shadow or vision) in Hades, the underworld. Homer says the soul 'flies away', which is why *eidola* were often depicted as winged beings. Such representations appeared on Greek funerary oil flasks up until the time of Hippocrates. The creatures flit around the image of the deceased or accompany Charon, the ferryman who fetches the souls in this world in order to take them to the next.





# DISSECTION

AS A BY ORLY LEWIS

# METHOD OF DISCOVERY

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The structures and functions of inner body parts — their anatomy and physiology — played a crucial role in informing ancient opinions on the soul, its location and workings in the body. How did the ancients learn about the parts of the body and their functions?

**DISSECTING AND VIVISECTING ANIMALS** An important way of gaining anatomical and physiological knowledge was the dissection and vivisection of animals. From as early as the sixth century BCE, Greek and Roman physicians and philosophers opened the bodies of deceased animals in order to learn about the size, shape, position, colour and texture of inner parts. They also explored the functions of parts and organs by opening the bodies of living animals. These vivisections allowed them to experiment with the living anatomical structures and learn about their functions: they cut into different parts of the brain or squeezed or severed nerves and vessels in order to observe the effects on the animal's motion, respiration or vocalisation. Monkeys and even bears were preferred on account of their respective resemblance to humans, but pigs, sheep and other animals were commonly used as well.

**HUMAN BODIES** The dissection of human bodies was considered a religious and moral desecration and was thus strictly forbidden throughout most of antiquity (and through the Middle Ages as well). However, for a short time in the third century BCE, physicians in the Hellenistic city of Alexandria (Egypt) were allowed to dissect and even vivisect human prisoners. This opportunity was seized by physicians such as Herophilus of Chalcedon and

Erasistratus of Ceos. The most important result of this unique research opportunity was the identification of the nerves as the conveyors of motor and sensory impulses (a role ascribed until then to veins and arteries). When this brief window of opportunity closed, anatomical and physiological research continued on the basis of the dissection and vivisection of animals, which yielded further important observations on the muscles, the ventricles of the brains and other parts. Galen described the methods of dissection and vivisection in detail in his long treatise entitled *On Anatomical Procedures*.

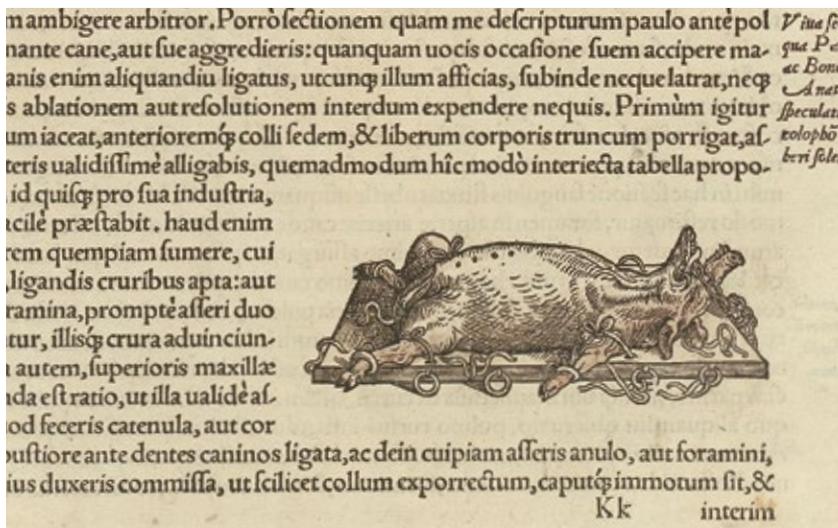
**EXAMINATION OF PATIENTS** Open wounds and severed limbs were another important source of information for ancient physicians. Galen, for instance, refers in his writings to observations he had made during his time as the official physician of the gladiators in Pergamum. It offered an opportunity to observe parts normally concealed beneath layers of skin and flesh. A deep sword wound to the chest, for instance, allowed physicians to observe the shape of the heart, the texture and position of the lungs, and other phenomena; at the end of an amputated leg one could observe the layout of the leg's vessels, nerves and muscles. Distinguishing these parts from each other was not straightforward, not even for the trained physician, but these chance and often hasty observations nonetheless provided rare occasions for looking inside the human body.

**METAPHORS AND ANALOGIES** Another source of knowledge was the outside world, in particular human crafts and tools. These offered philosophers and physicians a means for conceptualising internal processes in the body through analogies and metaphors. Digestion, for instance, was compared to cooking and described as a process in which the stomach heated and concocted the food as if it were a cauldron or an oven. The motion of the lungs was explained with reference to bellows, the heart was seen as a fountain of blood, and the nerves as the strings of a puppet.

**CELSUS** Herophilus' and Erasistratus' use of vivisection Moreover, [...] no one can apply remedies for [pains, and also various kinds of diseases, which arise in the more internal parts] who is ignorant about the parts themselves; hence it becomes necessary to lay open the bodies of the dead and to scrutinise their viscera and intestines. It is believed that Herophilus and Erasistratus did this in the best way by far, when they laid open men whilst alive – criminals received out of prison from the kings – and whilst these were still breathing, observed parts which beforehand nature had concealed, their position, colour, shape, size, arrangement, hardness, softness, smoothness, relation, processes and depressions of each, and whether any part is inserted into or is received into another. For when pain occurs internally, neither is it possible for one to learn what hurts the patient, unless he has acquainted himself with the position of each organ or intestine; nor can a diseased portion of the body be treated by one who does not know what that portion is. When a man's viscera are exposed in a wound, he who is ignorant of the colour of a part in health may be unable to recognise which part is intact, and which part damaged; thus he cannot even relieve the damaged part. External remedies too can be applied more aptly by one acquainted with the position, shape and size of the internal organs [...]. Nor is it, as most people say, cruel that in the execution of criminals, and but a few of them, we should seek remedies for innocent people of all future ages.

**GALEN** Book knowledge must be supplemented by autopsy Make it rather your serious endeavour not only to acquire accurate book knowledge of each bone but also to examine assiduously with your own eyes the human bones themselves. This is quite easy at Alexandria because the physicians there employ ocular demonstration in teaching osteology [study of bones] to students. For this reason, if for no other, try to visit Alexandria. But if you cannot, it is still possible to see something of human bones. I, at least, have done so often on the breaking open of a grave or tomb. Thus once a river, inundating a recent hastily made grave, broke it up, washing away the body. The flesh had putrefied, though the bones still held together in their proper relations. It was carried down a stadium [ca 185 m] and, reaching marshy ground, drifted ashore. This skeleton was as though deliberately prepared for such elementary teaching. And on another occasion we saw the skeleton of a brigand, lying on rising ground a little off the road. He had been killed by some traveller repelling his attack. The inhabitants would not bury him, glad enough to see his body consumed by the birds which, in a couple of days, ate his flesh, leaving the skeleton as if for demonstration.

ARISTOTLE On using animals to understand humans The inner parts [of the body ...] are unknown, especially those of man; consequently, one must refer to the parts of other animals which have a nature similar to that of humans, and examine them.



**Pig in preparation for vivisection, from: Andreas Vesalius, *De humani corporis fabrica*, Basel 1543, p. 661** Dissecting living animals — especially strong ones — was not an easy task. In order to perform experiments, e.g. with the nerves, they had to be conscious, which meant they struggled to resist. This illustration from Andreas Vesalius's famous

anatomy book shows how to tether a living pig with ropes, iron rings and chains onto a strong board so that it could not move during vivisection. Although the illustration is from the 16<sup>th</sup> c., it can give us an idea of how Aristotle and Galen performed vivisections and experiments on pigs more than 1,400 years earlier.

**GALEN** On dissecting apes If you have not the luck to see anything of this sort [naturally preserved skeletons as mentioned earlier], dissect an ape [...]. Choose those apes which most closely resemble humans, with short jaws and small canines. You will find their other parts also resembling those of human beings, since they can walk and run on two feet [...].



**Barbary macaque (*Macaca sylvanus*), taxidermy, 2015**

Originally found in North Africa, Barbary macaques were brought to Southern Europe as pets and circus attractions in ancient times. Aristotle used them in dissections due to their similarity to humans. Galen, too, opened up the bodies of these monkeys, but warned that their resemblance to humans might arouse distracting empathy during vivisections. With great insight into the internal arrangement of the mammal body came a number of errors arising from dissecting animals and translating the findings unchecked to humans. From the 12<sup>th</sup> c. onwards, the dissection of human cadavers was slowly beginning to be performed again. However, it took another 400 years before Aristotle's and Galen's authority in the field of anatomy diminished.

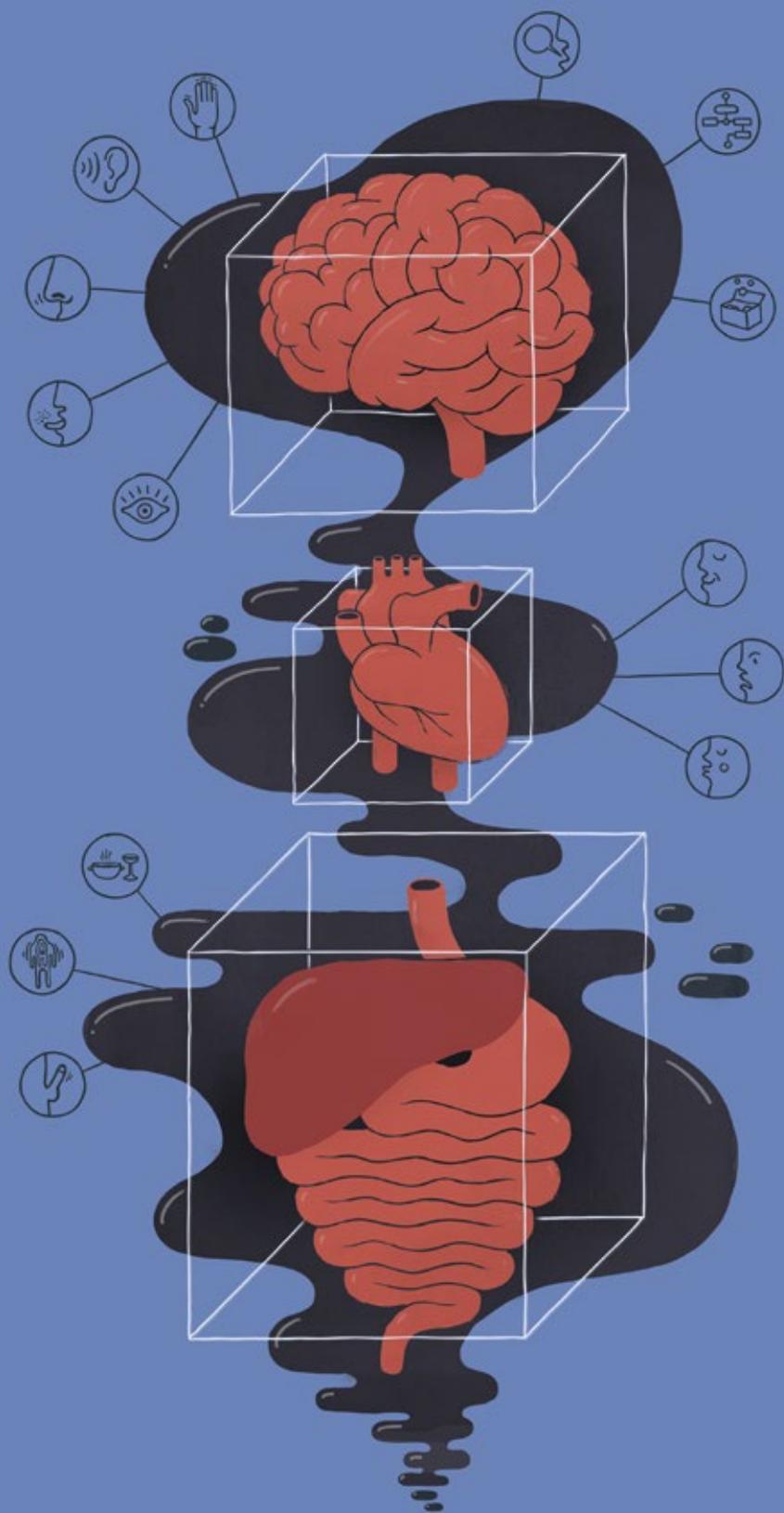
**GALEN** On vivisectioning apes I say, then, that for [the dissection of the living animal] you must procure either a pig or a goat [...], [so that] you [can] avoid seeing the unpleasant expression of the ape when it is being vivisected.

# LOCALISING THE SOUL IN THE BY ORLY LEWIS BODY

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How does our body know what to do? How do we know what happened last year, that the water is too cold, or that we require food? For the ancients, these and other cognitive and vital functions depended on the soul. But how did the soul orchestrate all these activities? The answer involved defining the location of the soul in the body — that is, identifying the organs and substances in which it resided or by means of which it directed each activity.

**LOCATING THE SOUL IN THE BODY** Among the organs which ancient physicians and philosophers identified as the seat of the soul or its faculties were the brain, the forehead, the heart as a whole and its left ventricle in particular, the liver, the abdominal area, the diaphragm and the chest area. The reasons for assigning the soul to these organs were varied, for example: the ‘leaping’ of the *heart* in extreme emotions such as fear or joy; the feeling of having ‘butterflies’ in the *stomach* or the ‘tightness’ in the *abdomen* with great excitement; the heat felt in the *left ventricle* of a newly-deceased heart during dissection; moisture observed in the *brain* of ‘epileptic’ goats; the similarity between the term for *diaphragm* (*phrên/phrenes* in Greek) and the Greek word for thinking, *phronein*. ☉ Most commonly, however, the ancients considered either the heart or the brain as the organ from which the soul directed the vital functions of the body as well as cognitive activities. These tasks were either executed by means of the brain or heart themselves — as in the case of thinking and interpreting sensory impressions — or by means of other parts, such as the mouth in case of speech and the limbs in the case of motion. Nevertheless, even those who saw the brain as the intellectual and



cognitive centre often considered the heart as the seat of emotions, which were envisioned as temperature changes in this organ or the chest area.

**ONE SOUL, THREE PARTS** One view argued that the soul consisted of three parts, which acted together in the body, but resided in different organs. This view was first developed by Plato and later elaborated by Galen and medieval philosophers and physicians. According to this view, the brain was the seat of the ‘rational soul,’ which directed intellectual and cognitive activity; the heart was the seat of the ‘appetitive soul’ responsible for emotions; and the liver or abdomen was the seat of the ‘nutritive’ or ‘desiring soul,’ on which nourishment, growth and reproduction depended.

**A HEALTHY SOUL IN A HEALTHY BODY** The ancients may have disagreed about the exact location of the soul in the body, or on its division into parts, but all these opinions reflected the belief that the soul was strongly connected to the smooth working of the body. A healthy soul (or mind) in a healthy body was more than just a slogan: it was one of the foundations of the medical art. Since the soul ‘resided’ in one or several of the organs, their condition and that of the body as a whole directly affected the soul’s performance. Thus, if drugs, diet or massage could reach and influence the bodily organs, they could also affect the soul and restore its healthy function.

**CHRYSIPPUS** An argument that the soul’s commanding faculty is located in the heart *We also say *egō* (I) in this way: pointing to ourselves at the place in which thought appears to be [i.e. the chest], the gesture being brought there naturally and instinctively. Also, apart from such a gesture of the hand, we nod toward ourselves [...]. For as we pronounce *egō* (I), at the first syllable we drop the lower lip in a way that points to ourselves [...].*



**Votive of a male torso, Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE** The only ancient images we have of the inside of the body are votive sculptures. These were objects left at healing sanctuaries and religious sites as offerings to gods or local deities. They usually represented either the part of the body that needed healing or were intended as symbols of gratitude for a cure received. A highly peculiar type of votive was first used by the Etruscans. Their specialities were interior organs and torsi with 'windows' that allowed insight into the cavities of the thorax and abdomen and onto the viscera inside them.

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**Votive of a male torso, Etruscan, 2<sup>nd</sup> c. BCE / 2<sup>nd</sup> c. CE** This naked torso is opened up to show the internal organs. Through a tear-drop-shaped window the heart can be seen at the top with the lower rims of the lungs on both sides and the diaphragm underneath. In the middle sits a fairly large liver with a long, thin gall bladder on top. The parallel c-shaped coils probably represent the intestines, and the little ball at the bottom of the window the urinary bladder. While the torso is modelled by hand, the representation of the intestines is formed by a typical, prefabricated polyvisceral plaque, usually sold as a separate votive.



**Two fragments of polyvisceral votive plaques, Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE** Although the arrangement of the abdominal organs corresponds more or less to reality, anatomical accuracy was not the potter's only concern; symmetry and a neat delineation of the organs were also important. Votives usually acted as permanent stand-ins for the dedicants and were considered as a means for communicating with the deity. The depiction of particular organs suggests that some general concept of localisation of illness in the body existed at that time.

**GALEN** The tripartite soul I have proved that an animal after birth is governed by three sources: one located in the head, whose role is by itself to provide imagination and memory and recollection, knowledge and thought and reasoning, and in its relation to the other parts of the animal to guide the sensation of the sensory parts and the motion of the parts that move voluntarily. A second source is seated in the heart; its role is by itself to provide the 'tone' of the soul, to be constant and unyielding in the things that reason commands [...]. The remaining power, seated in the liver, has as its role all the things that have to do with nutrition in the animal, the most important of which [...] is the production of blood. To this same power belongs also the enjoyment of pleasures, and when it is moved by this enjoyment more than it should be, it produces intemperance and licentiousness.



# BRAIN AND HEART AS ORGANS OF THE SOUL

BY ORLY LEWIS

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Today, we believe that the brain is where our sensations are processed, our thoughts and decisions made, our emotions controlled and our vital functions maintained. Nevertheless, we still speak of ‘following our heart’ rather than ‘head’. And although we know that memories are stored in the brain, we still learn something ‘by heart’. Language thus reflects an ancient controversy concerning the seat of the soul. In antiquity the brain and the heart were the organs most commonly associated with the soul and its faculties, but there were different opinions on how they did so and on which of the two held the ‘psychic reins’. In dissections, the inner and outer structures of the heart and brain were studied and recorded in detail, and these observations were then used as arguments to support either of these views.

**HEART-CENTRED VIEW (CARDIOCENTRISM)** Aristotle, Praxagoras and other proponents of the heart-centred view relied on their observation that the heart is the source of veins and arteries. Since they believed that these vessels conveyed cognitive information and instructions, such as motor and sensory impulses, they assumed that their anatomical starting-point must be the source of these faculties themselves. ☉ When claiming that motor commands are transmitted from the heart to the limbs, Aristotle referred to the similarity between the clearly visible cords inside the heart (*chordae tendineae*) and the ligaments and tendons connecting bones and muscles in the limbs. ☉ Aristotle believed that the heart was also the sensory centre in the body, to which impulses were transmitted from the sense-organs and where they were being recorded and interpreted. He supported his claim by referring to ‘passages’ connecting the tongue and skin to the heart (he probably had particular blood vessels in mind) and he made a point of explaining

why other sense-organs had no such passages, but were connected to the head instead. ☉ The author of a treatise entitled *On the Heart* referred to the structure of the left cavity of the heart in support of his view that human intelligence resided there, from where it directed the activities of the soul. Some Stoic philosophers conceived of this cavity in similar terms. These authors believed that the particularly strong and tight walls and membranes surrounding the left cavity protected the heat and intelligence inside it.

**BRAIN-CENTRED VIEW (ENCEPHALOCENTRISM)** The identification of a ‘passage’ from the eye to the brain (the optic nerve) was an early observation leading some physicians to the conclusion that the brain is the organ which processes sensory information. A little later, the Hippocratic author of a treatise on epilepsy traces the course of vessels to and from the brain in support of his view that the brain is the organ by means of which we perceive sensory information, make judgements and whose impairment renders us insane. ☉ This brain-centred view gained much support in the third century BCE, with the identification of the nervous system as the conveyor of motor and sensory impulses and of its connection to the brain and spinal cord. Some authors tried to explain how the brain’s matter is suitable for being imprinted with sensory impressions and storing them as memories. Galen, moreover, made a point of explaining how the nerves are in fact a continuation of the brain matter: they have coats like the brain’s meninges and are filled with the same substance from which the brain (i.e. cerebrum) is composed. This was crucial for his view on the workings of the nerves and the physiology of motion and sensation.

**‘MAPPING’ THE BRAIN** Different parts of the brain were thought to be responsible for different functions. For example, some authors believed that sensory capacities were directed by the front part of the brain, that thought and judgement took place in the middle ventricle of the brain and memory in the rear part – the idea of brain mapping was born! Galen described in detail the effects that cutting into the ventricles of the brain during vivisection of animals had on motor, sensory and vocal activities and used this to support his claim that the substance required for activities of the soul – the ‘psychic *pneuma*’ – was generated and stored in these ventricles. For the soul required not only organs in order to animate and activate the body, but also substances, of which *pneuma* was the most important one.



**Votive of a heart, 4<sup>th</sup>/3<sup>rd</sup> c.BCE**  
**Right: Votive of a female torso (damaged), 4<sup>th</sup>/3<sup>rd</sup> c. BCE** Ludwig Stieda, late 19<sup>th</sup>-c. anatomist from Königsberg (West Prussia) and collector of body-part votives, thought at first that this object represented a 'pathologically altered male glans', then the 'enlarged copy of a diseased nipple'. However, this is unlikely as votives usually represent healthy organs. Later it was thought that this object might be a piece of votive cake. A comparison to votive torsi with opened body cavities, such as this damaged female torso from Stieda's collection, suggests that the pyramidal striated object is a representation of the heart.



**ARISTOTLE** The primary sense-organ is localised in the heart **Certainly,** however, all blooded animals have the supreme organ of the sense faculties in the heart, for it is here that the common sense of all the sense-organs must be located.

**ARISTOTLE** The brain is an organ for cooling the blood **But** as all influences require to be counterbalanced, so that they may be [...] brought to the mean (for in the mean, and not in either extreme, lies the true and rational position), nature has contrived the brain as a counterpoise to the region of the heart with its contained heat, and has given it to animals to moderate the latter, combining in it the properties of earth and water. For this reason it is, that every blooded animal has a brain; whereas no bloodless creature has such an organ [...]. For where there is no blood, there in consequence [...] is but little heat. The brain, then, tempers the heat and the seething of the heart.

**GALEN** The main psychic faculties are localised in the brain **No** Stoic or Peripatetic philosopher and no physician is as bold as [they used to be], and some, at least, have publicly changed over to the true account: the physicians admitting that the power of sensation and motion flows from the brain to all the animal's members, and the philosophers that the reasoning part of the soul is situated there.

**‘HIPPOCRATES’** On the soul’s localisation in the brain Men ought to know that from the brain, and from the brain only, arise our pleasures, joys, laughter and jests, as well as our sorrows, pains, griefs and tears. Through it [...] we think, see, hear, and distinguish the ugly from the beautiful, the bad from the good, the pleasant from the unpleasant [...]. It is the same thing which makes us mad or delirious, inspires us with dread and fear, whether by night or by day, brings sleeplessness, inopportune mistakes, aimless anxieties, absent-mindedness, and acts that are contrary to habit. These things that we suffer all come from the brain, when it is not healthy, but becomes abnormally hot, cold, moist, or dry, or suffers any other unnatural affection to which it was not accustomed. Madness comes from its moistness. [...] For these reasons I think that the brain has the greatest power in a human being; for this is the mediator for us of the things that come-to-be from the air, [...] and the air provides it with sense. The eyes and ears and tongue and hands and feet do whatever the brain decides: for all parts of the body come to have sense to the extent that they participate in air. And the brain is what brings them to understanding.

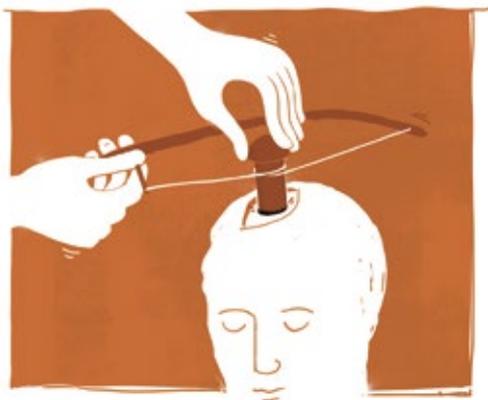
**GALEN** Evidence that sensation and motion depend on the ventricles of the brain After the bone of the head has been removed, the animal being still alive, [...] if you merely cut [the dura mater] or if you remove it entirely, the animal does not lose sensation or motion [...]. And even if you cut away the brain itself [...], even then the animal does not lose motion and sensation until the incision reaches one of the ventricles. Cutting the posterior [ventricle] harms the animal most, and next after that the middle [ventricle]. Each of the anterior [ventricles] causes less serious injury [...]. Pressure on the ventricles has the same effect as incision into them; and we see pressure sometimes applied, not intentionally, but with every effort made to avoid it, in men who are undergoing trepanation, when the bones of the head have been broken.



### Trepanation drills, ca 100 CE

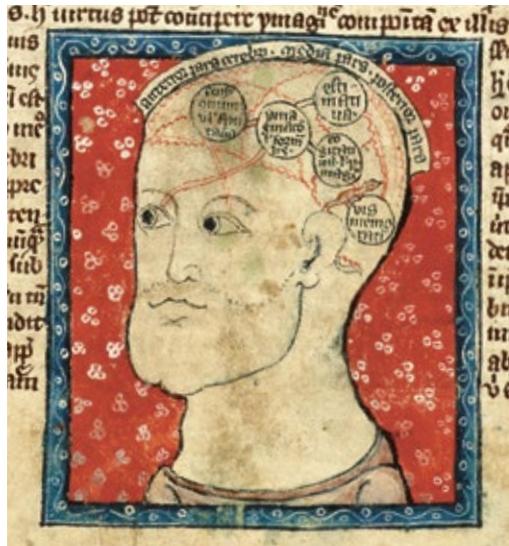
Trepanation, the process of opening the skull in order to remove foreign objects or to relieve pressure on the brain, is one of the most dramatic, but also one of the oldest known surgical operations. It has been practiced for at least 10,000 years, at first by scratching a hole into the bone with a stone or seashell, later by drills developed for this operation. Of such drills mentioned by Hippocrates, Celsus or Galen, only these two examples found in a physician's grave in the former Roman settlement of Bingen on the river Rhine are known to survive. Besides the two metal bits there were also a collapsible metal bow and a little metal cup. The latter may have been used to press the serrated drilling cylinder to the bone, while it was set in motion by an attached bowstring.

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**AËTIUS OF AMIDA** On the localisation of the rational soul capacities in different regions of the brain

If the front part of the brain is harmed [i.e. by inflammation], only the imaginative faculty is damaged, in case the middle ventricle of the brain is harmed, a derangement of the reasoning faculty occurs, but if the hinder part of the brain in the occiput is harmed, the faculty of memory perishes, but together with it generally also the other two. Those whose imaginative faculty is damaged judge correctly, but see strange things in front of their eyes. Those in whom only the reasoning faculty is deranged form images correctly, but do not judge correctly: those in whom the faculty of memory is deranged, do not remember anything of previous events correctly, nor do they form images correctly or judge correctly in most cases.



**Illustration of the human brain in a manuscript anthology, ca 1310**

This image represents a later development of an ancient brain theory reflected in the writings of Aëtius of Amida. While Aëtius distinguishes three areas where 'imagination', 'reasoning' and 'memory' were located, this image follows the medieval Arabic interpretation and shows five cognitive 'cells'

of the brain: Aëtius' 'imaginative faculty' has been subdivided into common sense and imagination, both connected with the eyes (and by implication also with the other sense-organs), and the 'reasoning faculty' has been subdivided into 'estimation' (judgement) and 'cogitation' (concept formation). Memory is physically connected with thought.



# SUBSTANCES

IN BY ORLY LEWIS

## SERVICE OF THE SOUL

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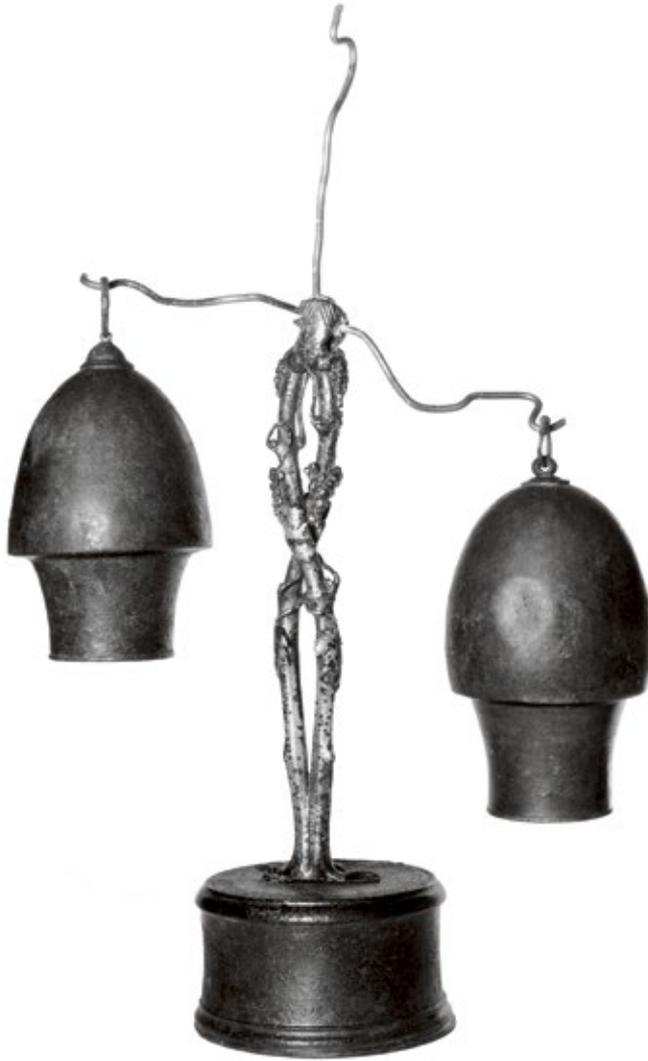
For the ancient Greeks and Romans, air and blood not only generated life and preserved it, they were also tightly linked to the functions of the soul and the activities directed by it, such as thinking, moving and perceiving. Air in particular took the leading role here, in the form of *pneuma* — ‘breath’, or inhaled air — that had been processed in the body. The air-turned-*pneuma* then assisted in the execution of the activities of the soul.

**BLOOD** Empedocles was one of the few who believed that the blood carried the soul and its commands through the body. Thus, he was convinced that the soul resided not in the heart or in the brain but in the blood. More commonly, however, blood was considered only as a nourishing substance for the body. Digestion turned food and drink into blood, which was then distributed by the veins throughout the body. It was absorbed by the parts and turned into flesh, bone and other elements of the body. It was also the matter from which embryos developed. But the ancients did not know about blood circulation or about oxygen and vitamins.

**PNEUMA** Most thinkers believed that blood only nourished, and that it was *pneuma* which helped the body move, perceive and think. *Pneuma*, they thought, was conducted through vessels and nerves. The distinction, in the late fourth century BCE of two different sets of vessels — arteries and veins — offered a means to separate the streams of blood on the one hand, and *pneuma* on the other. *Pneuma*, the ‘psychic substance’, was thought to run through the arteries which, it was believed, drew it in from outside the body and propelled it forward by means of their constant motion — the pulse. ☉ With the identification of the nerves as a third independent system of channels a

differentiation between types of *pneuma* was made: the 'vital *pneuma*', entering through the windpipe from respiration, flowed from the heart through the arteries together with a little fine blood and served to cool the body and digest food. The 'psychic *pneuma*' flowed from the brain through the nerves and contributed to intellectual, motor and sensory activity. This psychic *pneuma* was a mixture of refined vital *pneuma* reaching the brain through arteries and of respired air which entered the brain directly through the nose, bypassing the lungs. Neither type of *pneuma* was recycled, though — *pneuma* was either expended during the body's activities or expelled through the pores of the skin. ☉ For some thinkers *pneuma* was literally life-bearing: the Stoics thought that it was the adhesive matter holding the body together and considered it the soul itself. Aristotle, on the other hand, did not consider it the soul as such, but believed that it nonetheless ensouled each living-being, in so far that it guided its development from the embryonic stage to maturity.

**THE SOUL AND THE ELEMENTS OF THE BODY** *Pneuma* and blood were not, however, the only substances flowing through the body. There were also 'humours' of all kind and manner — various wet substances often labelled according to their texture, colour or other qualities, e.g.: yellow, green, white, black, glassy, salty, astringent, viscous, thick humour, phlegm, bile and many more. But their role in the physiology of the soul and of mental activity was minor. More important in that context were the elemental building-blocks of the body, both visible (e.g. veins, bones, arteries, nerves, flesh) and invisible (the elements fire, air, earth and water, or their qualitative counterparts hot, cold, dry and wet). Some authors believed that the soul itself was made of these invisible elements — for instance, from a mixture of water and fire. ☉ But even those who claimed that the material nature of the soul was unknown believed that the condition of the soul and its ability to perform its functions depended on the condition of the body and its parts, namely, the balance of the mixture of invisible elements (i.e. fire, water, etc., or hot, wet, etc.), the condition of the visible elements (veins, bones, etc.) and the quality and unhindered flow of *pneuma*.



**Cupping vessels and a bronze stand, ca 100 CE** One of the oldest and most common cures for almost anything was bloodletting (*phlebotomy*). This procedure was supposed to drain excess blood or *pneuma* and thus restore balance among the bodily substances. The flow of blood or *pneuma* could be controlled by cupping vessels, suction cups that drew the substance either from a tiny incision

or through the pores of the skin by means of vacuum. The doctor put a little burning lint into a bronze cup and quickly pressed the vessel's mouth to the body until it adhered by negative pressure. Bleeding was so widely used that cupping vessels became the symbol for the medical profession. This elaborate stand for storing or displaying cupping vessels was found in the grave of a physician in Bingen.

**ARISTOTLE** On blood and blood-vessels    The blood constitutes the nutriment from which the parts of the animal are directly formed. Likewise the blood-vessels must have the same originating source as the blood, since the one exists for the sake of the other – as a vessel or receptacle for it. In sanguineous animals the heart is the starting-point of the veins; they do not traverse it, but are found to stretch out from it, as dissections enable us to see.

**‘HIPPOCRATES’** Intelligence nourished by a special kind of blood    [Intelligence, which resides in the left cavity of the heart,] is nourished not from the gut by foods and drinks, but by a pure and luminous bath coming from a distillate of the blood. [...] That [intelligence] is not nourished by visible blood is made clear by the following: in an animal that has reached the state of *rigor mortis*, when the left cavity is cut open, it appears completely empty except for some serum and yellow bile, and the membranes mentioned above, but the artery has no shortage of blood, nor does the right cavity.

**‘HIPPOCRATES’** On blood as the psychic substance    Now I hold that no constituent of the body [...] contributes more to intelligence than does blood. So long as the blood remains in its normal condition, intelligence too remains normal; but when the blood alters, the intelligence also changes. There are many testimonies that this is the case.



**Attic drinking cup with fighting warriors, so-called Triptolemos Painter, potter: Euphronios, 490–480 BCE** The warrior in the middle is clearly defeated: He is bleeding from several wounds on his upper body, his sword is lowered, and he is sinking to his knees. In Greek vase painting, the depiction of blood was a welcome

opportunity to use added red in the otherwise limited colour spectrum. On the right side, the cup is punctured by several pairs of holes through which run metal clasps. This is an ancient repair; apparently, the painting made the cup worth keeping although it was broken.



**CELSUS** On bloodletting [S]evere fever, when the bodily surface is reddened, and the blood-vessels full and swollen, requires withdrawal of blood; [... so also] all acute diseases, provided [...] they are doing harm not by weakness, but by over-loading. [...] If the cause affects the body as a whole, blood should be let from the arm; if some part, then actually from that part, or at any rate from a spot as near as may be, for it is not possible to let blood from everywhere, but only from the temples, arms and near the ankles. [...] The vein ought to be cut half through. As the blood streams out its colour and character should be noted. For when the blood is thick and black, it is vitiated [corrupted], and therefore shed with advantage, if red and translucent it is sound, and blood-letting, so far from being beneficial, is even harmful; and the blood should be stopped at once.



**Scalpel for opening veins (phlebotome), with cautery, 200–250 CE.** The semi-circular iron blade was used for cutting the vein for bloodletting; the cut may have been cauterised with the ivy-leaf-shaped blade on the other end in case of complications.

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**GALEN** What we can learn about the pneuma from vivisection of the brain [T]he soul's first instrument for all the sensations of the animal and for its voluntary motions as well, is [...] *pneuma*; and therefore, when the *pneuma* has escaped [when the ventricles of the brain have been cut], and until it is collected again [i.e. the cut has been closed], it does not deprive the animal of its life but renders it incapable of sensation and motion. Yet if the *pneuma* were itself the substance of the soul, the animal would immediately die along with the escape of the *pneuma*.

**GALEN** The production of vital and psychic pneuma Now the *pneuma* in the arteries is called vital, and that in the brain is called psychic, not in the sense that it is the substance [of the soul], but rather the first instrument of the soul that resides in the brain, whatever its substance may be. Just as vital *pneuma* is generated in the arteries and the heart, getting the material for its generation from inhalation and from the vaporisation of the humours, so the psychic *pneuma* is generated by a further refinement of the vital [*pneuma* in the brain]. For it was necessary that this [psychic] *pneuma*, more than anything else, be changed in precisely the right way.



**ARISTOTLE** Innate pneuma as the source of strength Now all animals clearly both possess an innate *pneuma* and exercise their strength in virtue of it. [...] S]ince the origin [of motion] is in some animals situated in the heart, in others in what corresponds to the heart, it is therefore clear that the innate *pneuma* also is situated there.

# PHYSIOLOGY OF PERCEPTION

BY SEAN COUGHLIN

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Perception is the awareness of the world around us, and in antiquity that was strongly associated with the soul. After all, animals perceive, but things like plants and stones do not. There had to be something in animals that was responsible for this difference. This ‘something’ was called the ‘soul’. But perception also involves the body, we see, hear, smell, touch and taste through our sense-organs. If one of them becomes damaged or destroyed, our ability to perceive is also impaired.

**BODILY SENSATION AND PERCEPTUAL AWARENESS** Philosophers and physicians distinguished the bodily process of sensation from our awareness of those sensations in perception. The role of the body was to provide the soul with perceptual content: external objects act on our sense-organs, and provide the soul with a variety of sensations. The soul’s job was to arrange and unify this content into a coherent picture of the world. ☉ The distinction between the roles of body and soul gave rise to many questions. How do errors in perception arise, and is the error in the sense-organ or in the soul? Do things exist which we cannot perceive? How could we know? And why do we perceive some things as pleasant and others as painful, and what can they tell us about what is good for us and what is bad? Questions also arose about how perception worked. How do objects act on our sense-organs? And where in our bodies is the content co-ordinated and unified? These questions led to competing explanations of the physiology of perception and the interaction of body, world and soul.

**SENSATION – OBJECTS TO THE SENSES** Empedocles offered one of the earliest attempts to explain the physiology of sensation. He believed that the soul was a mixture of the four elements which made up the world – earth, water, air and fire. In other words: we sense objects in the world insofar as



they share some property in common with us. Sensation occurs when our soul reacts in sympathy to the elements in the objects of the external world. Seeing, for instance, is when the fire in your eyes reacts to the fire in the paper you are looking at; touching occurs when the earth in your hand reacts to the earth in the paper of this book in your hands. ☉ Empedocles' attempt to correlate sensations with the elements was problematic, not least because it could not explain how we sense things like movement or size, or objects such as people, which are not simply earth, water, air or fire. Nor could it explain why parts of our body like hair and nails, which also contain a mixture of the elements, are insensitive. These questions motivated later thinkers to clarify the conditions for sensation, and, more importantly, to explain how our various sensations were unified and organised. ☉ One approach focused on how objects at a distance affect the sense-organs. It was taken for granted in antiquity that we must come into physical contact with an object for sensation to occur. With touch and taste, this contact is obvious. But it is less clear how contact is made with things which we see, smell or hear. This led to a debate between those who believed the eye, for example, sent out visual rays to touch objects (a theory called *extromissionism*) and those who believed objects emitted something that reached our eyes (called *intromissionism*). *Extromissionism* was held by Plato and Galen, and was common until the Middle Ages. It persists in our language when we 'cast a glance' or see 'a spark in the eye.' *Intromission* was held by Democritus and Aristotle. Democritus believed that objects emitted streams of 'atoms,' some of which reached our eye. Aristotle thought that was highly improbable, especially in the case of things as far away as stars—why does wind not scatter the 'atoms'? Aristotle believed instead that objects sent an impulse through the medium (the air or water) between the object and the body. This impulse acted on our eye, much like feeling an object through a glove.

**PERCEPTION – THE SENSES TO THE SOUL** Regardless of how sensations arise in our sense-organs, those sensations have to be coordinated. We recognise, for instance, that we are touching the same book that we are seeing, and it was believed that this co-ordination occurred wherever the commanding faculty of the soul was located. ☉ Aristotle thought that this commanding faculty was localised in the heart. He noticed that the heart is connected to all the parts of the body by a network of blood-vessels, and he believed these vessels and the blood within them were good candidates for sensory conduits. Sensations from each sense-organ (sight, sound, smell, taste, touch) travelled through the blood vessels to the heart, where they were organised and arranged. Aristotle also called the heart the

‘common-sense,’ since it was responsible for perceiving properties that were common to all the senses: size, movement and number. ☉ The Stoics followed Aristotle, except they believed that sensations did not travel through the blood, but through psychic *pneuma*. The psychic *pneuma* stretched out from the heart like the tentacles of an octopus, travelling through the arteries and to the sense-organs. Sensation occurred when the psychic *pneuma* in the sense-organs was affected by an external object. And these sensations travelled back along the psychic *pneuma* in the arteries to the soul’s command faculty in the heart. When sensations arrived at the heart, they were impressed upon the soul, like a seal leaving an imprint on wax, and could later be recalled as memories. ☉ Herophilus and Erasistratus, however, noticed that when blood vessels were severed, animals could still perceive; yet, if they severed certain small, white, tube-like tissues in the body, the body was rendered senseless below where the tissue was severed. Through their dissections, Herophilus and Erasistratus found that these tissues—which they called ‘nerves’ (*neura*)—did not lead to the heart, but to the brain. Using this evidence, Galen would go on to argue against Aristotle and the Stoics that, ‘where the nerves have their source, there is the commanding part of the soul.’ Since the source of the nerves was the brain, it was the brain, not the heart, which contained the commanding faculty of the soul.

**EMPEDOCLES** On the elements in sensation **Empedocles says the soul is made out of all the elements, and that each of them is soul: ‘For with earth we see earth; water by water; with air, air divine; by fire, destructive fire. And love through love, and hate through noxious hate.’**

**ARISTOTLE** The wax metaphor of soul **In regard to all senses generally we must understand that perception is that which is receptive of perceptible forms apart from their matter, as wax receives the imprint of the signet-ring apart from the iron or gold of which it is made: it takes the imprint which is of gold or bronze, but not as gold or bronze.**

**PLATO** Extramissionist theory of vision    And of the organs [the gods] constructed first light-bearing eyes, and these they fixed in the face [... They] caused the pure fire within us [...] to flow through the eyes in a smooth and dense stream [...]. So whenever the stream of vision is surrounded by midday light, it flows out like unto like, and coalescing therewith it forms one kindred substance along the path of the eyes' vision, wheresoever the fire which streams from within collides with an obstructing object without. And this substance, having all become similar in its properties because of its similar nature, distributes the motions of every object it touches, or whereby it is touched, throughout all the body even unto the Soul, and brings about that sensation which we now term 'seeing.'

**THE STOICS** On vision and visual rays (extramissionist)    The Stoics [...] hold that we see when the light between the visual organ and the object stretches in the form of a cone: so Chrysippus in the second book of his *Physics* [...]. The apex of the cone in the air is at the eye, the base at the object seen. Thus the thing seen is reported to us by the medium of the air stretching out towards it, as if by a stick.

**LEUCIPPUS AND DEMOCRITUS** Atoms and vision (intromissionist)    Democritus says that seeing is the reception of the image from the thing seen. The image is the form which is imaged in the eyeball, as in other transparent objects which are capable of retaining the image. He, like Leucippus before him and Epicurus and his followers later, thinks that *eidola* [i.e. streams of atoms] flow off, similar in form to the things from which they flow (these are the visible things), and they impinge on the eyes of perceivers, and thus seeing occurs. He cites as evidence the fact that the image and *eidolon* of the thing seen is always present in the eyeball of the person who sees, which is what seeing is.



**Cataract needle, 200–250 CE**

Eye complaints were usually treated with salves and ointments, but there was one very effective surgical procedure as well: cataract surgery, where the natural lens of the eye, clouded by age and turned opaque, was pushed below

the pupil to restore free passage for the light — whether it was a light coming from inside the eye or from the outside world made no difference. For this operation, the patient needed great courage, while the eye surgeon had to be accurate and very dexterous.

**CELSUS** On cataract surgery The patient [...] is to be seated opposite the surgeon in a light room facing the light, while the surgeon sits on a slightly higher seat; the assistant from behind holds the head so that the patient does not move; for vision can be destroyed permanently by a slight movement. [...] Thereupon a needle is to be taken pointed enough to penetrate, yet not too fine; and this is to be inserted straight through the two outer tunics [layers of the eye] at a spot intermediate between the pupil [...] and the angle adjacent to the temple, away from the middle of the cataract in such a way that no vein is wounded. The needle should not be, however, entered timidly [...] When the spot is reached, the needle is to be sloped against the suffusion itself and should gently rotate there and little by little guide it below the region of the pupil; when the cataract has passed below the pupil it is pressed upon more firmly in order that it may settle below. If it sticks there the cure is accomplished; if it returns to some extent it is to be cut up with the same needle and separated into several pieces, which can be the more easily stowed away singly and form smaller obstacles to vision. After this the needle is drawn straight out; and soft wool soaked in white of egg is to be put on, and above this something to check inflammation; and then bandages.

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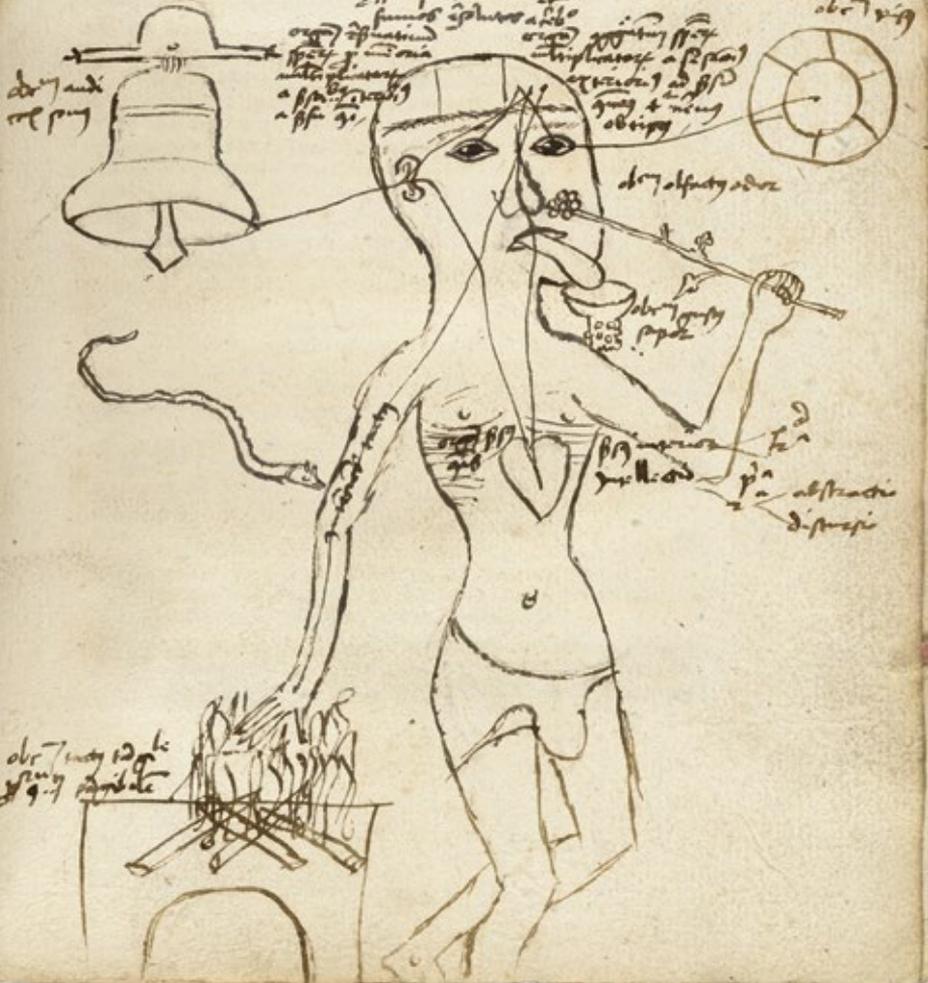
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**ARISTOTLE** The location of the common sense [It is in the heart] that the common sense of all the sense-organs must be located. Clearly, we see that two senses extend there – taste and touch – and so the other [senses] must [extend there]: it is possible for the sense-organs other [than taste and touch] to produce movement in the heart; taste and touch, however, do not extend towards the upper part of the body [i.e., the brain, and so the common sensorium cannot be located there].

**Illustration of senses and faculties of brain function, drawing in: Gerardus Harderwyck, *Epitomata seu Reparationes totius philosophiae naturalis Aristotelis*, Cologne 1496** The large drawing on the end paper of a printed collection of Aristotle's writings on natural philosophy gives a synopsis of all the sense-organs and where in the body their impressions are processed. One port of call for all sensations is the first brain cell on

the right, the *sensus communis*. However, sound and taste have a further connection to the heart, reflecting Aristotle's cardiocentric view on the ruling part of the soul. The two heads on the top show the idea that the brain is divided into five cells, not three, which was developed later by Galen and others. It seems the author of this drawing was trying to harmonise different views on the workings of the brain and the physiology of the senses.

**Drawing in a manuscript copy of Aristotle's *De anima*, written and illustrated by Johann Lindner, 1472–1474** This drawing represents an encephalocentric view on how the senses work. The sense-organs have a direct line to the brain only; the heart, labelled 'cor', is shown at the bottom of the page without any physical connection to any of the senses. The first brain cell, called '*sensus communis*', collects all sensory impressions and fits them together to a coherent representation of the world. It then passes them on to the other

cells — imagination, fantasy, cognitive power, and finally memory. The division of the brain and its functions into five cells is usually credited to Aristotle's Arabic readers, such as Qusta ibn Luca (864–923 CE), and particularly Ali ibn Sina, also known as Avicenna (ca 980–1037), who wrote extensive commentaries on Aristotle's writings. Thus, the drawing is no faithful illustration of Aristotle's text, but rather a commentary on the discussion surrounding it.

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# REPRODUCTION AND THE SOUL

BY SEAN COUGHLIN

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Today, scientists often think of reproduction as a way of replicating our genes: we might not live forever, but our genes will live on. This way of thinking would not seem unfamiliar to Aristotle. He believed that one of the distinctive features of all living beings is their ability to self-replicate: they make copies of themselves, and their copies make copies that make copies. That way, even though their bodies will weaken and wear out in time, their soul can live on through their offspring. Aristotle called this capacity of living beings their ‘generative soul,’ and saw it as a manifestation of the soul’s desire to attain eternity.

**MODELS OF REPRODUCTION** Yet reproduction raises many questions: why do children resemble their parents? Why do some offspring become female and others male? And how does an embryo know how to develop and how to grow? In antiquity, these questions gave rise to competing models of how living beings produced new life.

*Flower-Pot (Preformationism)* Anaxagoras attempted to answer these questions using an analogy. He believed reproduction was like planting a seed in a flower-pot. Within the male, there exist tiny, fully-formed human seeds — male seeds in the right testicle and female seeds in the left testicle. Life is formed when the male plants one of these seeds in the female womb (males on the right side of the uterus and females on the left), and the preformed seed is fed by the mother’s blood and grows in size. This model, however, was unsatisfactory. It failed to explain how the tiny human seed is produced in the first place, and it was difficult to see how female offspring could resemble their mothers if she only provided nourishing blood.

*Jigsaw Puzzle (Pangensis)* Concerns with seed-theories like Anaxagoras' prompted Empedocles, Democritus and the Hippocratic writer of *On the Nature of the Child* to come up with a new model. These thinkers believed that each parent emitted a tiny part from every part of their body into the womb, where they were mixed together. The pieces from each parent found their other half and fit together like a jigsaw puzzle. Whichever puzzle piece was stronger determined whether that part would look like the part from the mother or the father. This model was able to explain why offspring resemble both parents, and how the seed is produced in the first place.

*The Builder (Epigenesis)* Aristotle, however, did not think these theories were sufficient. He had examined chicken embryos at different times and saw that their parts developed gradually, some parts first and others later. To him, this meant that reproduction was not like planting a seed or putting a puzzle together. Something, he thought, had to be guiding the process of development, shaping and forming the embryo over time. Aristotle believed this to be the generative soul. Like a master builder, the generative soul produces offspring not by becoming a physical part of what it creates, but by fashioning and shaping the material according to a blueprint.

**MALES AND FEMALES** Aristotle's model required assigning males and females different roles in reproduction: he identified the male as the agent which forms the embryo, and the female as the source of the material out of which the embryo is formed. One consequence of assigning these different roles was that females were viewed as imperfect or inferior versions of their male counterparts. Animals were conceived when the male's generative soul used *pneuma*, contained in the semen, as an instrument to shape the menstrual blood into a copy of itself. When the menstrual blood is shaped according to plan, a male is produced. However, when a mistake or accident occurs in the process, a female is produced. ☉ Galen was not convinced by this theory. He agreed with Aristotle that females played a subordinate role in reproduction. However, he thought Aristotle's model implied the male soul was a bad builder: if half the population was female, that meant the male soul failed around fifty percent of the time! To avoid this conclusion, Galen revived the idea from the Hippocratic tradition that both males and females contribute semen (the puzzle-pieces model). But, he combined it with the Aristotelian idea that semen is the instrument through which the soul guided the process of development in its striving for eternity.

**PLATO** Analogy of reproduction and weaving [T]he soul is long-lasting, while the body is weaker and lasts a shorter time. Someone might say that each soul wears out many bodies, especially if it lives many years. For if the body was depleted and destroyed while the person is still alive, still the soul always weaves anew the body which has worn out [...].

**Votive of a uterus, Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE** As pregnancy and childbirth are often accompanied by anxiety, it is hardly surprising that many anatomical votives were shaped as female reproductive organs to ask for help with conception, birth or in the case of uterine disorders. The horizontal ridges, which do not match normal uterine appearance, might indicate the organ's ability to contract and expel the baby during birth. The smaller smooth ovoid shape is probably the urinary bladder. This suggests that the uterus and bladder are depicted not as seen from the front but in profile. Of the many uterus votives that have been found some contain a small clay ball. It can only be seen on an X-ray, and it has been thought that this represented an embryo inside the womb.

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**ARISTOTLE** Epigenesis or the builder model [W]hen the active and the passive come in contact with each other [...] one acts and the other is acted upon. The female, then, provides matter, the male the principle of motion. And as the products of art are made by means of the tools of the artist, or to put it more truly by means of their movement, and this is the activity of the art, and the art is the form of what is made in something else, so is it with the power of the nutritive soul. And just as later on this soul causes growth from the nutriment in the case of mature animals and plants, using heat and cold as its tools (for in these is the movement of the soul), and each thing comes into being in accordance with a certain formula, so also from the beginning does it form the product of nature. For the material by which this latter grows is the same as that from which it is constituted at first [i.e. blood]; consequently also the power which acts upon it is identical with that which originally generated it; if then this acting power is the nutritive soul, this is also the generative soul, and this is the nature of every organism, existing in all animals and plants.

**GALEN** On male and female contribution to reproduction Let us suppose then that this sort of ‘modelling’ comes from the semen. But, if only the male produces semen, then it would not ever happen that the offspring resembles the mother. So, in any case, [Aristotle’s] argument is in difficulty. For if resemblance is brought about by the capacity, i.e., by the semen, the offspring will resemble only the male, and will never become anything like the mother. But if it comes from the matter, i.e., the menstrual blood, they will resemble only the mother, and will never be anything like the father. Surely, though, they appear to resemble both parents, so that the premises [of Aristotle’s argument] need to change.

# NUTRITION

LIFE AND BY GIOULI KOROBILI

# HEALTH OF THE ENSOULED BODY

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**NUTRITION AS CONSUMPTION OF FOOD** From early antiquity onwards, almost every aspect of life, such as hospitality towards friends or strangers, the exchange of gifts, sacrifices to the gods, or victory in battle was most closely connected with symposia and with dining. This led some philosophers to warn against the dangers attending the immoderate consumption of food and drink, which might eventually affect the soul. Plato, for instance, treats the body as a source of evil from which the soul must be purified and liberated. To that end, the soul must not yield to, but rather resist the affections of the body through abstaining from the so-called pleasures related to food and drink, from sexual pleasures, and from the pleasures of ornament.

**NUTRITION AS VITAL FUNCTION** Yet in the fifth and fourth centuries BCE, nutrition began to be understood as more than just the activity of consuming food and drink. Doctors and philosophers came to regard nutrition as the first and most basic faculty of the ensouled body, by which it was enabled to preserve its own being, to grow and to function properly. ☉ Aristotle, looking at nutrition from a biological point of view, treated nourishment as absolutely necessary and insisted that no physiological function can be fulfilled if the body is not properly nourished. Of the physical functions, nutrition is the first to take place when a living body comes into being; it thereby inaugurates the joining of the material body with the spiritual soul. Unlike Plato, Aristotle did not define a distinct place in the body for the nutritive part of the soul, but located it with the other functions of the soul in the heart. ☉ For Galen, too, nutrition is a vital function. Sustenance, together



with growth and generation, comprise the 'natural faculties' which remain vital powers until the body completes its development. After that, these faculties turn out to be handmaids of the psychic ones, such as sensation and voluntary movement, exercised by the brain.

**NUTRITION AND HEALTH** In antiquity, health was generally regarded as one of the highest goods. From Hippocratic times, ancient doctors were concerned with the effects of the quality and quantity of nutriment on human health. They believed that nutrition exerts a direct and significant impact upon the organism's internal balance. They developed elaborate systems of dietetic rules in order to regulate people's health; these rules needed to be flexible as they had to be adjusted all the time in accordance with variations in bodily conditions, season, climate and other environmental factors. Dietetics included not only nutrition but also exercise, bathing, sleep, massage, sexual activity, etc. It was believed that by way of a healthy lifestyle, one could maintain and improve the quality of everyday life and thereby obtain longevity. On the other hand, malnutrition could lead to bodily illness, hence nutriment was also regarded as a natural medicine used both for treatment and prevention of disease. Even if the ancients were unaware of notions such as energy and calories, they certainly realised the importance of nutrition to health.

**NUTRITION AND LIFE-STAGES** Nutrition also had to be adjusted according to life-stage. Many ancient authors speak of an organism's life-cycle consisting of four stages, conception, growth, flourish, and decline, which are the natural phases of its development. At each of these stages, the presence of the soul inside the body is beyond doubt; however, vital factors such as internal heat and *pneuma* require a stable process of nutrition, with the kind and amount of food being adjusted according to the person's needs, which in turn are dependent on one's age and constitution.

**ARISTOTLE** The nutritive soul is necessary for life [E]verything that is alive and has a soul, from its birth to its death, must possess a nutritive soul. For what has been born must grow, reach maturity, and decay – all of which are impossible without nutrition. Therefore, the nutritive faculty must be found in everything that grows and decays.



**Fragment of a votive of the lower abdomen, Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE** This polyvisceral plaque differs in its representation of the abdominal organs from that of other types. Perhaps it was meant to draw attention more specifically to the digestive

system, of which can be seen a pear-shaped stomach with stylised intestinal loops as well as two hook-shaped kidneys. Votives were usually made from a mould, which accounts for the existence of different types as well as for the great similarity of those of a type.



**Attic drinking cup, painter: Makron, potter: Hieron, ca 490 BCE** Symposia — all-male drinking parties — were important social events. Although they often ended in the drunken revellers' procession about town (a so-called *komos*), they were also favourite occasions for social intercourse, for listening to music, and for discussing poetry, philosophy and politics.

The strong Greek wine was drunk mixed with water while the guests were lying on richly-cushioned dining couches, which on this cup are decorated with leaves hanging off them, painted in red. At a later stage of the symposium, women — professional musicians, dancers and prostitutes — were admitted to entertain the men.

**ARISTOTLE** Fire is necessary for nutrition Now the other faculties of the soul cannot exist apart from the power of nutrition [...], and this depends on the natural fire [...]. But fire, as we have already stated, is destroyed in two ways, either by extinction or by exhaustion. It suffers extinction from its opposites. Hence fire can be extinguished by the surrounding cold, both when it is compact and more easily when it is scattered over the body. Now this way of perishing is due to violence, in living beings as much as in lifeless objects, for the division of an animal by instruments and consequent congelation by excess of cold cause death. But exhaustion is due to excess of heat; for, if there is too much heat close at hand and the thing burning does not have a fresh supply of fuel added to it, it goes out by exhaustion [...]. Hence, if it is going to continue it must be cooled, for cold is a preventive against this form of extinction.

**GALEN** What is the difference between generation, growth and nutrition  
 Generation [i.e. the development of a living being in the womb] is not a simple activity of Nature, but is compounded of alteration and of shaping. That is to say, in order that bone, nerve, veins, and all other [tissues] may come into existence, the underlying substance from which the animal springs must be altered; and in order that the substance so altered may acquire its appropriate shape and position, its cavities, outgrowths, attachments, and so forth, it has to undergo a shaping or formative process. [...] Growth is an increase and expansion in length, breadth, and thickness of the solid parts of the animal (those which have been subjected to the moulding or shaping process). Nutrition is an addition to these, without expansion.

**GALEN** The higher functions of the soul are influenced by nutrition So, then, let those who are unhappy with the notion that nourishment has the power to make some self-controlled, some more undisciplined, some more restrained, some more unrestrained, as well as brave, timid, gentle, kind, quarrelsome and argumentative – let them now have some self-control, and come to me to learn what they should eat and drink. They will derive the greatest benefit with regard to the philosophy related to their characters; and in addition to this they will make progress in the capacities of their rational souls, too, becoming more intelligent, with regard to virtue, and having better memories.

**PLATO** The body is an evil that keeps the soul from the truth But [the soul] thinks best when none of these things troubles it, neither hearing nor sight, nor pain nor any pleasure, but it is, so far as possible, alone by itself, and takes leave of the body, and avoiding, so far as it can, all association or contact with the body, reaches out toward the reality. [...] So long as we have the body, and the soul is contaminated by such an evil, we shall never attain completely what we desire, that is, the truth. For the body keeps us constantly busy by reason of its need of sustenance; [...] the body fills us with passions and desires and fears, and all sorts of fancies and foolishness, so that [...] it really and truly makes it impossible for us to think at all.



**Attic drinking cup, attributed to the Brygos Painter, ca 490 BCE**

On his last sip from this cup, the drinker was greeted by the picture of a symposiast vomiting into a large bowl. His head is delicately supported by a boy, probably a slave or a male prostitute. The image and its placement inside the cup testify to the saucy humour

of the ancient Greeks. The calm atmosphere and sick man's little helper make it unlikely, however, that the painting is meant as a warning to the drinker. And indeed, while vomiting was one of the violent consequences of a symposium, it was also recommended precariously to pace oneself during an evening.



**Lithotomy scoop and scalpel (blade missing), 200–250 CE**

Bladder stones were considered the most painful of diseases and a motive for suicide. Without anaesthesia and antiseptics, the surgery to excise a stone from the bladder, lithotomy, was a painful and extremely dangerous operation. It was so hazardous and awful for the patient that it was excluded from the doctor's duties in the Hippocratic Oath: 'I will not cut, even for a stone, but I will leave such procedures to the practitioners of the craft.' By the 1<sup>st</sup> century CE these 'practitioners of the craft' had specialised tools, like this scoop with a roughened bowl that could be used to catch and pull out the stone through a perineal incision.

**PLATO** The nutritive soul is a wild beast. The part of the soul that has appetites for food and drink and whatever else it feels a need for, given the body's nature, they [i.e. the gods] settled in the area between the midriff and the boundary toward the navel. In the whole of this region they constructed something like a trough for the body's nourishment. Here they tied this part of the soul down like a beast, a wild one, but one they could not avoid sustaining along with the others if a mortal race were ever to be. They assigned it its position there, to keep it ever feeding at its trough, living as far away as possible from the part that takes counsel, and making as little clamour and noise as possible, thereby letting the supreme part take its counsel in peace about what is beneficial for one and all.

# MOVEMENT

AS A BY RICARDO JULIÃO

# SIGN OF LIFE

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To Graeco-Roman philosophers and doctors, movement and perception are the two elementary signs of life. To be alive is to have a soul organising and enabling the body to perceive and to move. However, why and how is a body set in motion?

**PUPPET MODEL** The reason we move is that there is something that matters to us: we move in order to get food, we run from danger, we walk to get home, we do sports to keep fit and healthy, ... In short, we move for a reason. And in order to set the body in motion the soul must be stimulated. This stimulus can be something perceived through the sense-organs, or an idea we imagine or think of. Aristotle called the ‘thing’ that stimulates us to act a *phantasia* — roughly speaking an image or representation — which is always accompanied by an estimation: We see a chocolate cake and we are either attracted to or repulsed by it. The natural physiological reaction to attraction or repulsion, according to Aristotle, is either a heating or a chilling around the heart, as he assigned the role of collecting and assessing those *phantasiai* to the heart. Furthermore, this change in temperature makes the *innate pneuma* in the heart expand or contract, which in turn causes our motor apparatus to be activated by means of the sinewy cords inside the heart. The cords are like strings going straight from the heart to the bones and set the limbs in motion as with a puppet: our arms stretch out towards the cake, or our legs move to walk away from it. The muscles, incidentally, in Aristotle’s explanation of movement, have no functional role at all — they are considered mere flesh.

**THE NEURO-MUSCULAR MODEL** Things began to change when the Alexandrian doctors Erasistratus and Herophilus discovered the nervous system, and when the Roman physician Marinus realised the immense role of



the muscles. This gave rise to a new way of explaining how voluntary movement takes place. Galen is our best source for this idea: he divides all bodily activities into ‘natural’ and ‘psychic’ functions. ‘Natural’ are those functions performed by nature, which we cannot control at will, such as nutrition and growth, whereas voluntary movement and perception are ‘psychic’ ones. This means that the latter are, to some extent, under the control of the ruling part of the soul (*hêgemonikon*): If I want, I can stop walking, but I cannot stop digesting if I wish to. ☉ The main point of this new way of seeing was that the control centre of voluntary movement and perception is not in the heart but in the head, because the nerves (*neura*) have their origin in the brain. Following Herophilus, who discovered the existence of two kinds of nerves, the sensory and motor ones, Galen stated that each of them stems from a different part of the brain: the motor nerves from the spinal marrow, the sensory nerves from the anterior part of the brain. The former – the motor nerves – are harder and more resistant than the latter, as they have to travel a much longer distance to reach the muscles in the limbs, whereas the sensory nerves of sight and taste, for instance, are closer to the brain and do not need to be so resilient. Moreover, Galen observed that the motor nerves do not end in the bones, but in the muscles. Thus the nerves, in conjunction with ligaments and tendons, which tighten the muscles to the bones, work like levers to facilitate the body’s motion. In addition, they are conduits for a psychic power, the *pneuma*, sent from the brain to fuel the muscles and to give them the necessary information to initiate motion. For this reason, Galen conceived of the muscles as instruments of the soul.

**MOVEMENT AND WELL-BEING** Movement also plays an important role in the preservation of health and well-being. By exercising the body one improves both the natural and the psychic faculties of the organism: Walking after dinner facilitates digestion, and physical exercise not only strengthens the body’s organs, bones, tissues, and muscles, but, by sympathy, also sharpens the cognitive and intellectual capacities. For instance, Aristotle and his followers were called *peripatetikoî* because they used to walk about while doing philosophy: It seems that going for a walk in good company facilitates the activity of thinking.

**ARISTOTLE** Animal movement is like the movement of puppets. The movement of animals is like that of automatic puppets, which are set moving when a small motion occurs: the cables are released and the pegs strike against one another. [...] For [the puppets] have functioning parts that are of the same kind: the sinews and bones. The latter are like the pegs and the iron in our example, the sinews [*neura*] like the cables. When these are released and slackened the creature moves.



**GALEN** Mechanics and physiology of walking

The function of the whole leg is walking, and this occurs when the joints in it are alternately extended and flexed. For example, since the muscles in front of the knee pass over the kneecap and are attached by tendons to the bone of the lower leg, whenever they pull on the lower leg, extension occurs, whereas when the posterior muscles function in the same way, flexion occurs. [...] Thus, the muscle is clearly apparent, contracting and retracting toward its own origin, when it is stripped bare of the overlying skin, but when it moves, there is no perceptual movement of the actual nerve which passes down to it, although it seems likely that this is the path of the downward passage of power from the brain.

**Fragment of a marble sculpture, Hellenistic, probably 2<sup>nd</sup> c. BCE**

The muscles are strong, but the flesh is beginning to sag. The leg must have belonged to the statue of an old working man, probably a fisher or shepherd. If it was not intended as a votive image and paid for by the model himself, it might have been a showpiece to display the sculptor's superior skill.

**GALEN** The role of muscles in animal movement One should conceive [the flesh of the muscle] like a field irrigated by several conduits, one of those is the nerve mentioned above, but there are two others, one of hot, thin, and vaporous blood, and the other of thick and cold blood. The former of these is called artery, the latter vein. These conduits, having their sources from the heart and from the liver, permeate the muscle and through them the muscle becomes not simply a field, but like a plant; by means of the third conduit, that from the great source [the brain], it becomes not simply a plant but something better than a plant, because it has acquired sensation and voluntary movement, attributes by which the animal is differentiated from the non-animal. In virtue of these powers, therefore, the muscle has become a psychic instrument exactly as it has become a natural instrument in virtue of the arteries and veins. The movements of the arteries and veins are indeed natural and involuntary, but those of the muscles are psychic and voluntary.

**GALEN** The role of the nerves in animal movement

The commonality of all the nerves [*neura*] with the brain and the spinal cord is of no small importance for all the muscles; it is necessary, indeed, that they receive a nerve either from the brain or the spinal cord. This nerve seems small but it is, indeed, not slight in power. This is recognisable in pathologies. In fact, cutting, compressing, contusing, binding with a ligature, scarring or putrefying thwarts the muscle from all sensation and movement.

[...] Thus, there is in the nerves a great power coming from above and flowing to them from the great origin. The power is not innate to the nerves nor does it stem directly from them.

[...] The nerves, being analogous to conduits, carry power to the muscles from some fount out of the brain. As soon as they join with the muscles, the nerves divide into many directions. Some divisions go to one part, others to others, and at last completely separating into delicate membranous fibres, they form a plexus [network] through all the body of the muscle.



**Panathenaic prize amphora, so-called Berlin Painter, ca 470 BCE** Mild physical exercise was recommended for well-being and thus part of dietetics as described by 'Hippocrates' or Galen. However, fierce athletic competitions were also popular and had an enormous social importance. Winning athletes could count on fame as well as valuable prizes. The prizes at the Panathenaic festivals, large

sporting events in Athens, were huge amphorae filled with olive oil from the gardens of the Academy. On one side the respective discipline is shown, in this case a sprint of four runners with typically out-stretched arms and legs. While this conveys beautifully the dynamics of the movement, the painter depicts the first and the last sprinter in an unnatural pose with each moving their right arm and leg simultaneously.



**Attic drinking cup, in the manner of the Antiphon Painter, potter: Euphronios, ca 480 BCE** Only two of the six racers in this garland of naked, muscular men in motion are depicted in a realistic running posture. Each is flanked by two racers in amble pace (i.e. the arm and leg of the same side are moved in the same direction). The painter was more concerned with the ornamental arrangement and

variegated views of the bodies than a correct representation of the movement. All runners wear racing caps. The inside of the cup is adorned with a young athlete (a pugilist) whose chest muscles are picked out carefully with a thin red varnish over the contour of his body. He is about to wrap a long bandage around his fist for fighting.

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**GALEN** Exercise with a small ball The mental faculties, moreover, are sharpened by the concern not to drop the ball and to prevent the opponent from seizing it. For though such concern or worry in itself leads to thinning, when combined with some exercise which is connected with a pride in success and is able to cause pleasure, it is of the greatest benefit both to the health of the body and the intelligence of the soul.



**Fragment of an Attic drinking cup with athletes, so-called Boot Painter, ca 460 BCE** The Greek gymnasiums, public sport and leisure facilities, provided good settings for depicting attractive young men. The pose and muscle rendition of the athlete on the right as well as the red inscription 'kalos' (beautiful) mark him as particularly admirable. However, there was also criticism of the athletes' excessive attention to their bodies.

**GALEN** Athletes neglect their soul Of natural goods, some belong to the soul, some to the body, and some are external. Now, that the athletes have never, even in a dream, enjoyed the goods of the soul is clear to everyone. To begin with, they are unaware that they have a soul, so far are they from understanding its rational nature. Because they are always occupied in the business of amassing flesh and blood, their souls are as it were extinguished in a heap of mire, unable to contemplate anything clearly, mindless as beasts without reason. There might be some dispute as to whether they possess bodily goods. But in fact there exists no more dangerous bodily state, if Hippocrates is to be believed. He describes the 'peak of good condition' which these people pursue as 'dangerous'. And he says: 'Practice for health: moderation in food, confidence in labour'.



# DISEASES OF THE SOUL, INSANITY BY CHIARA THUMIGER AND MENTAL HEALTH

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What happens when the functions of the soul are damaged or impaired? What was considered a ‘disease of the soul’ in ancient medicine corresponds only in part to modern psychiatric categories. In the broad sense of the word ‘soul’ as the principle of life, every disturbance of one of the vital functions of the human organism could count as a disease of the soul, as it jeopardised life in all its various manifestations. Yet in ancient medicine and philosophy, there was a tendency towards a more restricted sense of the term ‘psychic illness’ referring to those conditions that especially affected a person’s cognitive and emotional life and the behaviour resulting from this. Thus mental diseases included disorders of reasoning, speaking and remembering, sensorial and motor disturbances, as well as eating, sleeping and sexual disorders. Classical examples of such diseases were *phrenitis*, an acute disease accompanied by mental derangement, high fever and the futile groping of the hands, and *melancholia*, a disturbance of the mind accompanied by fear and depression, sometimes also manifesting itself in ecstatic outbursts. Other examples of such mental diseases were epilepsy, caused by blockage of *pneuma* or blood in the vessels, and hysterical suffocation, which was believed to be peculiar to women as it was caused by movements of the uterus.

**A PLURALITY OF VIEWS** There was considerable variety of opinion among ancient doctors about the nature and causes of mental illness. Some medical authors conceptualised disorders of the soul like any other disease of the body, with physical causes and manifestations (e.g. black bile, fever); others understood madness rather as moral deviance, expressed through reproachable behaviour, lack of self-control or failure to manage one’s passions

(as in *satyriasis*). For others still, personal aspects such as spiritual imbalance, emotional suffering and existential anguish were central features: mental health thus became a more comprehensive matter of individual self-realisation, happiness and worth. Remarkably, discussions of mental pathology never adopted a neat separation between mind and body, but presented the two as intertwined and interdependent.

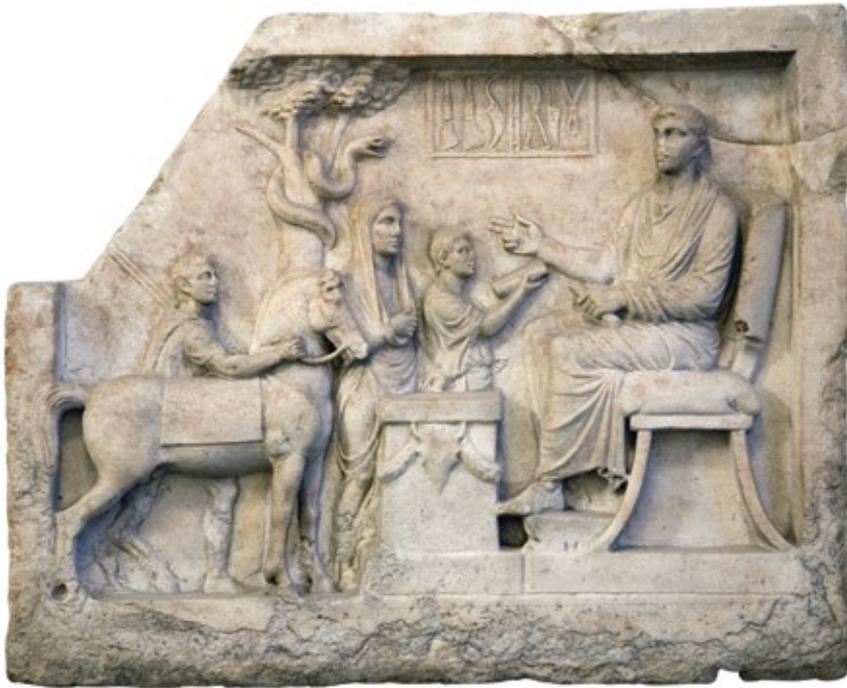
Ancient doctors further argued about the following questions:

*Localisation* Is a mental illness located where the soul resides, i.e. the brain or the heart, or where it manifests itself, e.g. in the limbs as in the case of spasms in epilepsy? Were mental illnesses always necessarily ‘diseases of the soul’? The answer to these questions partly depended on where one believed the soul to reside, e.g. in the brain, or in the heart, or in the blood. Yet often we find a more holistic portrayal of mental illness, centred on the description of key bodily symptoms and generalised manifestations of distress. We also find explanations of mental disturbance caused by ‘co-affection’: one part of the body that is affected by disease may pass on the disturbance to other parts of the body where cognitive faculties are located: this was the explanation for hypochondria or ‘epigastric melancholy’, which found its origin in the region of the stomach but transmitted the affection to the brain, where it caused delirium, depression and fear.

*Classification* We find different syndromes and labels for mental diseases, and a multitude of patient descriptions that in some cases show similarity, but may also contradict each other. Thus Plato spoke of two kinds of *anoia* (mental impairment); the Roman author Celsus described three types of *insania* (madness), corresponding to *phrenitis*, *mania* and *melancholia*. No unified taxonomy established itself as the standard in the ancient world, and the focus tended to remain on clinical aspects, the observation and description of ill individuals, rather than on theoretical considerations.

*Therapy* Can mental illness be cured? And if so, is the cure physical, achieved by means of surgery, medication or dietetic prescriptions (including food, exercise, sexual activity, baths, and so on), similar to those followed for bodily ailments? Or should it be of a psychotherapeutic kind? The contrast between these two options, a dispute still intense nowadays, goes back to the ancient world, where physicians in the Roman period began to include counselling, soothing and comforting practices into the range of possible therapies. These included entertainment and diversion, and psychological comforting through

various means (e.g. music, poetry reading); in some cases, a philosophical approach was developed, as in the case of Galen's ethical writings, concentrating on the management of emotions. Forms of spiritual coaching and self-help strategies were devised, including supervised ethical training, which resemble kinds of cognitive behavioural therapy as we know it today. Overall, however, in the ancient world a clear-cut distinction of 'mental' from 'bodily' disease was never achieved: the framework in ancient medicine remained firmly somatic, and even the efficacy of psychotherapeutic measures was ultimately believed to depend on their impact on bodily states and structures.



**Funerary relief for a physician, 1<sup>st</sup> c. BCE / 1<sup>st</sup> c. CE** The deceased is shown larger than life on the right, sitting behind an altar, like a hero or a god; his clothes, hairstyle, and the ring on his left hand, however, mark him as a mortal individual. He is characterised as a philosopher or orator by his gesture and the scrolls in

his and his worshipper's hands. In addition, he is clearly identified as a physician — less by the snake which commonly accompanied heroic figures, but by the case of surgical instruments on the top of the relief. The left half of the case holds two scalpels and a knife with curved blade, the right two pairs of forceps and another knife.

‘HIPPOCRATES’ On therapy Diseases that drugs cannot cure are cured by the knife. Those that the knife cannot cure are cured by fire [= cauterisation]. Those that fire cannot cure must be considered incurable.





Previous pages: **Scalpels and cylindrical box for medical instruments, various probes, hooks, tweezers, 1<sup>st</sup> c. BCE – 2<sup>nd</sup> c. CE and modern replicas** This selection of instruments may give an idea of the range of tools available to general practitioners and surgeons: Probes of different shapes and lengths were used to explore body cavities or wounds, the edges of wounds were held apart with hooks, and differently shaped tweezers served to grab foreign objects or bone fragments. Probes and other long thin instruments were carried in cylindrical metal boxes, scalpels and forceps in cases as seen in the funerary relief on p. 87.

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**NEMESIUS OF EMESA** A case history of phrenitis In some people suffering from *phrenitis*, sensation is preserved but thought alone is harmed. Galen records such a case. When a certain wool-worker was working in his house, a man suffering from *phrenitis* sprang up and took some glass utensils, rushed to the windows and, calling each of the instruments by name, asked the passers-by if they wanted it to be thrown down below. When bystanders said they did want it, he first hurled each of the utensils and then asked those present if they also wanted the wool-worker to be thrown down. They thought the affair was a joke and so said that they did want it. So he took the wool-worker and pushed him down from above. This man was sound in his sensations, for he knew that the things were instruments and the man was a wool-worker, but his thinking was diseased. Others are prone to phantasies and think that they see what they do not see, but are rational in other matters. These were impaired only in the frontal ventricle of the brain while the central one remained unaffected.

**RUFUS OF EPHEBUS** A case history of melancholy Another man, twenty years of age, was saved from drowning. Because of his fear [of drowning], melancholy befell him. A physician treated him [...] by uninterrupted purging with pungent drugs. At last, he purged with black hellebore. Then he was at a loss. Another physician treated him with a moistening [diet], and by giving him food, and cheering him up. Then he became calm, and was cured. The cure was effected by both physicians, since the first purged the [disease] matter, and the second balanced the mixture.

**‘HIPPOCRATES’** Hallucinations due to a swollen liver [W]hen bile collects in the liver [...] it swells up, and by its swelling it expands against the diaphragm [...] Pain attacks the head immediately. [...] The patient] does not hear clearly, or see either [...W]hen his liver expands more against the diaphragm, the patient becomes deranged; there seem to appear before his eyes reptiles and every sort of beasts, and fighting soldiers, and he imagines himself to be fighting among them [...] T] his disease usually attacks abroad, if a person is travelling a lonely road somewhere, and fear seizes him [...].

**ARETAEUS** Lack of self-control due to satyriasis Satyriasis [...] is an unrestrainable impulse to sexual intercourse; but [the patients] are not relieved at all by the intercourses [...] They wrap themselves up, and remain silently sorrowful; they are stupid, as if grievously affected by their condition [...] If the affection overcomes the patient’s sense of shame, he will lose all restraint of tongue as regards obscenity and likewise all restraint in regard to the open performance of the act, being deranged in understanding as to indecency; for they cannot restrain themselves, are thirsty, and vomit much phlegm.



**Three instrument handles with sockets, insertable tweezers and hook, 2<sup>nd</sup> – 1<sup>st</sup> c. BCE or modern replicas** These instrument handles feature slit-like sockets into which the ends of the hook and the tweezers can be inserted. Such plug-in fittings are known from ancient times only for mounting blades onto handles. As the iron blades would wear out more quickly than the bronze handles, they needed to be easily exchangeable. Furthermore, the handles here are all dual-purpose: apart from receiving the blade, they

also serve as a pestle, scoop and spatula for grinding and applying salves or medicine. While these features, replaceable blades and multi-purpose handles, are known to exist in ancient instruments, this is the only example of an army-knife style system of interchangeable parts. Not even the early 20<sup>th</sup>-c. collector, Theodor Meyer-Steineg from Jena, was fully convinced that this set was truly ancient. However, he thought it intriguing enough to preserve it for future examination.

**‘HIPPOCRATES’** A disturbance of the female reproductive soul (hysterical suffocation) [I]f a woman’s uterus moves against her liver, she will suddenly lose her speech, grind her teeth, and take on a livid colouring [...] [T]his happens to unmarried women, especially if they are advanced in age and widowed, but also if they are young and widowed after having had children [...].

**GALEN** On coaching to keep the soul healthy Do you not think that rage is a sickness of the soul? Or do you think that there was nothing in what the ancients said, when they gave the name ‘affections of the soul’ to all these: distress, anger, rage, desire, fear? But the following seems to me much the best course of action for one who would as far as possible be without the above affections: first, on rising in the morning one should consider [...], whether it is better to live a constant slave to the affections, or to employ reason on every occasion; secondly, that the man who wishes to become a decent human being must call to himself someone else who will make evident to him everything done incorrectly by him; furthermore, that one must have this belief to hand, every hour of every day: that it is better to esteem oneself among those decent human beings, but that it is impossible for that to happen for us without our having that person who made our errors evident; [...] even if he occasionally criticises you falsely, he has, then, provoked in you a more accurate examination of your actions.

**THE HIPPOCRATIC TREATISE ON REGIMEN** The author describes the soul as a composite entity made of fire and water. This entity is very dynamic, forever in motion within the body as well as through special channels, or ‘pores’, in and out of the body. As a consequence, the proportion (or ‘blend’) of fire and water varies from one person to the next, and within each individual’s life-time and circumstances. This proportion determines a person’s intellectual and emotional strengths, weaknesses and flaws, and has great consequences for mental health and cognitive performance, such as speed of thinking, powers of concentration and memory. If the proportion of water exceeds that of fire, the soul is slow and dull; if fire surmounts the water, the soul is quick and irritable. The blend of fire and water can be influenced and managed by physical measures that may enhance or optimise a person’s mental capacities and performance. This can be achieved by a strict regimen consisting of specific patterns of eating, drinking, exercise, bathing, purging, sleeping and sexual activity. However, as the author points out towards the end of this passage, there are limits to what extent the blend and thus the states of the soul can be manipulated by regimen.

‘HIPPOCRATES’ On health and ill health of the soul, its management and treatment by means of dietetics, and the boundaries of curability **The facts are as follow with regard to what are called the intelligence of the soul and the want of it.**



The moistest fire and the driest water, when blended in a body, result in the most intelligence, because the fire has the moisture from the water, and the water the dryness from the fire. Each is thus most self-sufficing. The fire is not in want of nourishment so as to wander far, nor is the water in such need of motion as to be dulled. So each is thus most self-sufficing by itself, as are both when blended with one another. For that which has least need of its neighbours attends most closely to the things at hand, as is the case with such fire as moves the least and not by necessity, and by such water as moves the most and not by force. The soul blended of these is most intelligent and has the best memory. But if by the influence of some addition one or the other of these grow or diminish, there will result something most unintelligent, because things blended in the original way are most self-sufficing.



If there be a blend of the purest fire and water, and the fire fall a little short of the water, such persons too are intelligent, but fall short of the former blend, because the fire, mastered by the water and so making slow motion, falls rather dully on the senses. But such souls are fairly constant in their attention, and this kind of man under right regimen may become more intelligent and sharper than natural endowment warrants. Such a one is benefited by using a regimen inclining rather towards fire, with no surfeit either of foods or of drinks. So he should take sharp runs, so that the body may be emptied of moisture and the moisture may be stayed sooner. But it is not beneficial for such to use wrestling, massage or like exercises, for fear lest, the pores becoming too hollow, they be filled with surfeit. For the motion of the soul is of necessity weighed down by such things. Walks, however, are beneficial, after dinner, in the early morning and after running; after dinner, that the soul may receive drier nourishment from the things that enter; in the early morning, that the passages may be emptied of moisture and the pores of the soul may not be obstructed; after exercise, in order that the secretion from running may not be left behind in the body to contaminate the soul, obstruct the passages and trouble the nourishment. It is beneficial also to use vomiting, so that the body may be cleansed of impurities left behind owing to any failure of exercise to purify, and after the vomiting gradually to increase the amount of food for more than four days at least. Unction is more beneficial to such persons than baths, and sexual intercourse should take place when the onsets of water occur, less, however, at the onsets of fire.



If in any case fire receive a power inferior to that of water, such a soul is of necessity slower, and persons of this type are called silly. For as the circuit is slow, the senses, being quick, meet their objects spasmodically, and their combination is very partial owing to the slowness of the circuit. For the senses of the soul that act through sight or hearing are quick; while those that act through touch are slower, and produce a deeper impression. Accordingly, persons of this kind perceive as well as others the sensations of cold, hot and so on, but they cannot perceive sensations of sight or hearing unless they are already familiar with them. For unless the soul be shaken by the fire that strikes it, it cannot perceive its character. Souls of such a kind have this defect because of their coarseness. But if their regimen be rightly regulated, even these may improve. The regimen that benefits is the same as in the former case, with food drier and less, and with exercise more in amount and more vigorous. Vapour baths too are beneficial, as is the use of vomiting after them, and the food

after the vomiting should be increased at longer intervals than in the former case; following such a regimen will make such men more healthy and more intelligent.



But if the fire should be mastered to a greater extent by the water in the soul, we have then cases of what are called by some 'senseless' people, and by others 'grossly stupid.' Now the imbecility of such inclines to slowness; they weep for no reason, fear what is not dreadful, are pained at what does not affect them, and their sensations are really not at all those that sensible persons should feel. These persons are benefited by vapour baths followed by purging with hellebore, the diet to be the same as before. Reduction of flesh and drying are called for.



But if the power of the water prove insufficient, and the fire have a pure blend, the body is healthy, and such a soul is intelligent, quickly perceiving without frequent variations the objects that strike it. Such a nature implies a good soul; correct regimen, however, will make it too better, and bad regimen will make it worse. Such a person is benefited by following a regimen inclining to water, and by avoiding excess, whether of food, drink or exercise, with exercises on the circular and double tracks, wrestling and all other forms of athletics, but he must in no case fall into excess. For if his body be in a healthy state and be not troubled from any source, the blend of his soul is intelligent.



But if the power of the water be further mastered by the fire, the soul must be quicker, in proportion to its more rapid motion, and strike its sensations more rapidly, but be less constant than the souls discussed above, because it more rapidly passes judgment on the things presented to it, and on account of its speed rushes on to too many objects. Such a person is benefited by a regimen inclining more to water than the preceding; he must eat barley bread rather than wheaten, and fish rather than meat; his drink should be well diluted and his sexual intercourse less frequent; exercises should be as far as possible natural and there should be plenty of them; violent exercise should be sparingly used, and only when necessary; vomiting should be employed after surfeits, in a way as to empty the body with a minimum of heat. To reduce the flesh of such persons conduces to their intelligence; for abundance of flesh cannot fail to result in inflammation of the blood, and

when this happens to a soul of this sort it turns to madness, as the water has been mastered and the fire attracted. Such persons are also benefited if they eat a meal before they go about their duties, instead of doing them without food, as their soul is more stable when it is mixed with its appropriate nourishment than when it lacks nourishment.



But if in any case the water be yet more mastered by the fire, such a soul is too quick, and men of this type inevitably suffer from dreams. They are called 'half-mad'; their condition, in fact, is next door to madness, as even a slight untoward inflammation results in madness, whether arising from intoxication, or from overabundance of flesh, or from eating too much meat. Such persons ought to abstain from all these things and from surfeit of every kind, as well as from violent forms of exercise; their diet should consist of unkneced barley bread, boiled vegetables (except those that purge), and sardines, while to drink water only is best, should that be possible, otherwise the next best thing is a soft white wine. There should be plenty of walking in the morning, but after dinner only just enough to unbend the limbs; the object is to empty the body by the morning walk, but not to dry the food as the result of walking after dinner. Preferable to unction is a tepid shower-bath. It is also beneficial to have in summer a short, occasional siesta, to prevent the body being dried up by the season. In spring it is a good thing to purge with hellebore after a vapour bath; then the usual diet should be restored gradually, as this type of man, like the preceding, must not go about duties fasting. With this treatment such a soul may be highly intellectual.

It is this blending, then, that is, as I have now explained, the cause of the soul's intelligence or want of it; regimen can make this blending either better or worse. When the fire prevails in his courses, it is doubtless possible to add to the water, and, when the water prevails in the blend, to increase the fire. These things are the source of greater or less intelligence in souls. But in the following cases the blend is not the cause of the characteristic: – irascibility, indolence, craftiness, simplicity, quarrelsomeness and benevolence. In all these cases the cause is the nature of the passages through which the soul passes. For such dispositions of the soul depend upon the nature of the vessels through which it passes, upon that of the objects it encounters and upon that of the things with which it mixes. It is accordingly impossible to change the above dispositions through regimen, for invisible nature cannot be moulded differently. [...]



# On Textual and Material Sources of Ancient Medicine

BY PHILIP VAN DER EIJK AND UTA KORNMEIER

Our main sources of information about ancient medicine are texts and artefacts, archaeological and anthropological remains (such as skeletal evidence, mummified human tissue, traces of nutrition and living patterns). With the lapse of time, much of this evidence was lost or severely damaged, through destruction by fire or by decay due to environmental conditions, or because it was mislaid and subsequently disappeared. In order to find out how people in the ancient world thought about body and soul, and how they dealt with health and disease, historians of medicine (and philosophy) therefore have to do detective work: they have to discover the relevant evidence and reconstruct the past on the basis of fragmentary material. Yet considering that some of the sources are more than 2,000 years old, it is amazing how accurate the information they provide can be and how close we can get to ancient people's ideas.

**Written Sources** In antiquity, many doctors carefully recorded their observations, their diagnoses and their therapeutic advice. They wrote case histories of the patients they examined and treated, collected these records, and on the basis of these collections developed more general theories. They also wrote treatises setting out their ideas about body and soul, about health, and the causes and treatment of disease. The development of Greek and Latin medical writing was a major factor in the communication and transmission of ideas to patients and to medical students. Philosophers, too, wrote down their ideas in the form of dialogues and treatises, which were studied in the philosophical schools. ☉ Before paper was introduced in the Middle Ages, people used writing tablets, wooden frames with a thin layer of wax, and papyrus, paper-like

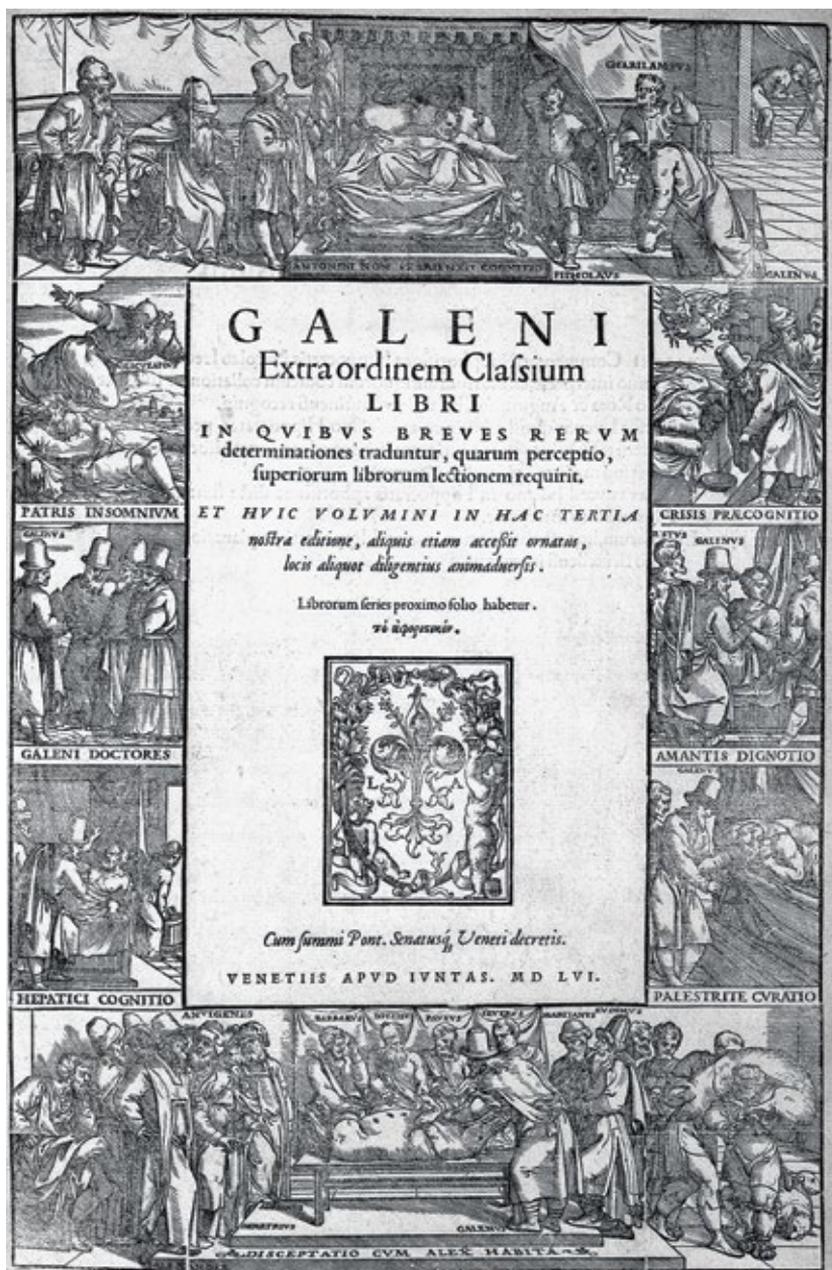


**Papyrus fragment of the 7<sup>th</sup> book of Galen's *De placitis Hippocratis et Platonis*, front and back, 3<sup>rd</sup> c. CE**

Right page: **Manuscript of Galen's *De placitis Hippocratis et Platonis*, fol. 61r, 13<sup>th</sup> c.** Beginning of the 6<sup>th</sup> book: 'It was my purpose [...] to inquire about the powers that govern us, whether they all have the heart [καρδία(ς)] as their only source, as Aristotle [Ἀριστοτέλης] and Theophrastus [Θεόφραστος] supposed, or whether it is better to posit three sources for them, as Hippocrates [Ἱπποκράτης] and Plato [Πλάτων] believed.'

material made from the papyrus plant. Later on, they also used parchment, processed animal skin, and bound the pages in the form of the *codex*, the precursor of our hardback. Texts were copied manually, by scribes (usually slaves). Some doctors, such as Hippocrates and Galen, became so famous that numerous copies of their works were made, which were used as textbooks in medical education for many centuries. Likewise, Plato and Aristotle soon became the leading authorities in philosophy, and their works circulated widely, well beyond the philosophical schools. Other medical and philosophical writers were less successful in securing authoritative status: their works were gradually forgotten and we only know about them indirectly, through quotations in other writers. Thus Galen is a major source for the views of Praxagoras, Herophilus, Erasistratus and the Stoics, while Aristotle is an important reporter of the views of earlier philosophers such as Anaxagoras. ◉ Many papyrus texts still survive today, as they were preserved in the favourable environmental conditions of the Egyptian desert. Yet they are often damaged or torn apart, so that





we sometimes have to supplement the text where the papyrus is fragmentary. Other texts survive in the form of medieval manuscripts, which were produced in the libraries of monasteries. It was only in the early 16<sup>th</sup> century that the first printed copies of the extant works of Hippocrates, Galen, Plato and Aristotle saw the light of day, reflecting the end product of manual transmission over more than a thousand years. Naturally, in this process many texts disappeared, or mistakes crept into the tradition, leading to different versions of one and the same text. In some cases, the Greek or Latin original text was lost but it survived in the form of a translation into Arabic or Syriac, as Islamic doctors and philosophers took great interest in Greek and Roman medicine. Nevertheless, considering the primitive circumstances in which people had to read and write and the length of time separating later copies from the original moment of composition, it is amazing how many texts have survived from the ancient world and how faithfully the manuscripts have preserved the writings of their original authors. Reconstructing what people like Galen and Aristotle wrote on the basis of careful examination of the manuscript tradition is the business of palaeographers and philologists: the results of their work are reflected in today's critical editions of the ancient texts. Sometimes, new texts emerge from dusty Byzantine tomes: thus one of Galen's works on 'psychotherapy', *How to Avoid Distress*, which was deemed lost, was discovered just ten years ago in a fragile 15<sup>th</sup>-century manuscript: nobody had noticed it before because of a mistake in the manuscript's table of contents!

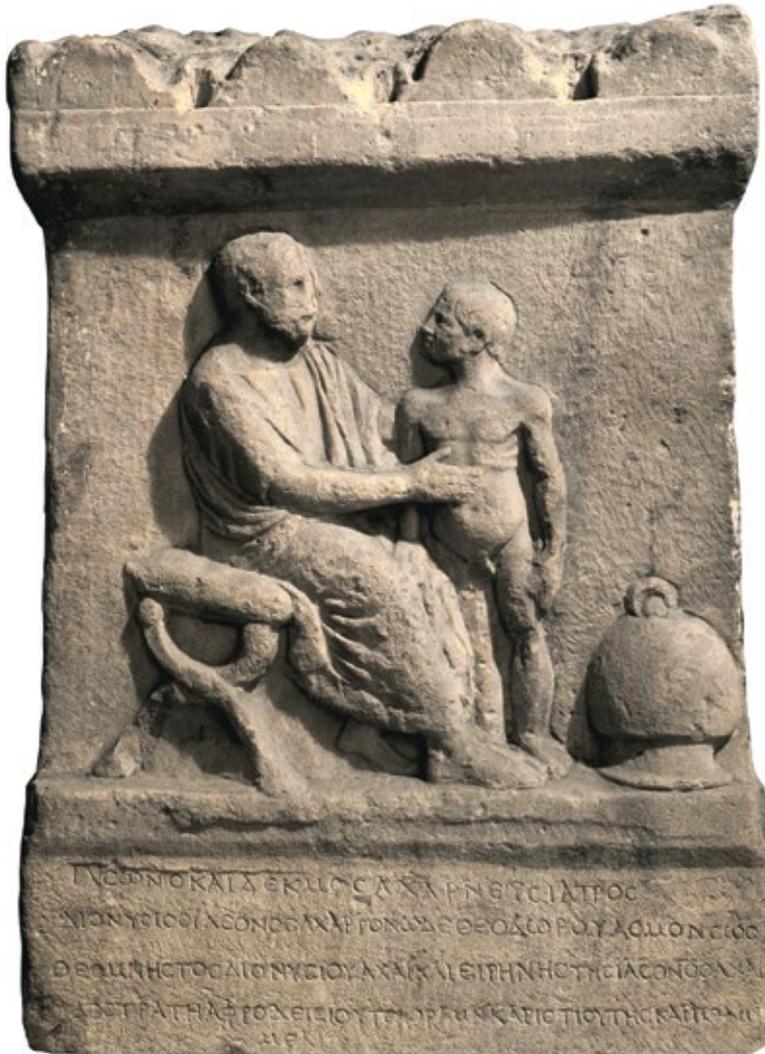
**Translation and Interpretation** Bridging the gap between the thoughts of the ancient world and today is not only a matter of restoring and reconstructing ancient texts: it is also a matter of translation, interpretation and contextualisation. Doctors in the ancient world had to invent a medical vocabulary, first in Greek, then in Latin. They had to create a terminology that adequately reflected their observations and ideas about bodily parts, symptoms and diseases. Likewise, philosophers developed sophisticated concepts and technical terms to convey the subtleties of their theories and distinctions. Many of these technical terms still survive in our modern languages today, but often the meaning

Left page: **Galen, *Opera omnia*, Venice 1556** The title page of the first printed edition of Galen's complete writings shows several scenes of Galen himself, wearing a tall top hat, attending to his patients. The image at the bottom

depicts one of his famous public vivisections of a pig. To emphasise Galen's enduring relevance, his audience includes medical and philosophical authorities who lived centuries after him.

of these words has changed. Thus the Greek word *organon*, from which our word ‘organ’ is derived, literally means ‘instrument’, ‘tool’: when Galen says that the body is the *organon* for the soul, he means that the soul uses the body as its instrument or tool in order to carry out its job and to achieve its goal. This is quite different from today’s medicine using the term ‘organ’ to refer to a specific category of bodily parts. Likewise, many medical terms for diseases have changed in meaning: for example, what the ancients refer to as *typhus* is not the same thing as what medicine today understands as ‘typhoid fever’, and our word ‘melancholy’ means something different from the Greek *melancholia*. Thus when reading ancient medical texts, we have to be careful and try to understand them in their own terms and within their historical context. The same applies to ancient philosophical terms: thus the Greek word *phantasia* is usually translated ‘imagination’, but this is too much restricted to the visual domain. It also suggests a creative aspect that is usually not intended: it rather means ‘mental representation’, and can also refer to input from the other senses, hearing, smell, taste and touch. And sometimes, words can evoke all sorts of different associations in different languages, because of the history of their usage: ‘soul’ and ‘mind’ are good examples in English, as are ‘Seele’ and ‘Geist’ in German!

**Material Remains of Artefacts** While medical and philosophical texts give us a relatively good insight into ancient ideas on life, the soul and the body, objects and images have, at first glance, little to say about conceptions of internal bodily processes or the interplay of body and soul. Yet, from the different surviving artefacts we can learn a great deal about the application of medical cures, about the images people might have had of the inside of the body, and what it was about their daily lives that may or may not have made them into patients for ancient doctors. ☉ The most obvious archaeological remains of artefacts related to ancient medicine are the physicians’ tools. Medical instruments, however, are difficult to identify as they were not always made exclusively for medical use. And even when they were, many of them do not look very specific and can easily be mistaken for something else. In an archaeological excavation, when the context of the finds is not yet clear, objects used in the kitchen, a painter’s or potter’s workshop, or for cosmetic purposes, are often misinterpreted as medical probes, spatulas or surgical knives, and the other way round. Furthermore, instruments made of iron, such as forceps for pulling teeth or the blades of scalpels, will have rusted away. Only those parts made from metal alloys like bronze or brass survive, which means we have only a partial picture of the instruments ancient physicians used. As the archaeology of medicine became more popular in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries and



**Funerary relief for the physician**

**Jason, ca 100 CE** The seated doctor in a philosopher's robe examines a patient. The respective sizes of the elements in this image indicate their significance: the doctor and his trade mark, the cupping vessel, are large, while the patient is so small that he can be mistaken for a child.



**Doctor aiding a wounded warrior, Roman, 1<sup>st</sup> c. CE** This relief is part of an elaborate grave found in Cologne. The suffering warrior has put down his weapons, shield and helmet, and is now leaning against a tree while the surgeon carefully spreads a wound in his chest. The instrument in his right hand is hard to identify, it might be a sponge to clean out the wound.

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the knowledge of and experience with ancient medical remains was still in the process of being compiled, many misclassified objects and outright forgeries were bought by early collectors. This obscures our material basis even further. However, the medical context for some of the surviving instruments cannot be mistaken because their shape has barely changed in the last 2,000 years, as in the case of the gynaecological speculum. ☉ We owe our best archaeological material on ancient medicine to the funerary practices of the Romans of the imperial period who buried instruments of the deceased person's trade alongside their bodies. Perhaps the most spectacular of such finds was the grave of a doctor in Bingen on the Rhine in 1924. Next to a cremation urn, assembled in a large bronze bowl, around 60 objects were discovered, most of them unmistakably medical instruments. Amongst these were 13 scalpels, some with large portions of their iron blades intact, three cupping vessels including an elaborate stand decorated with vine tendrils, and a set of instruments for drilling into the skull (for the Bingen trepan, cupping vessels and scalpel see pp. 42, 47 and 88). In another grave in the former Roman settlement of Wehringen, near Augsburg, a leather case holding six surgical instruments was found together with a box with several compartments containing medicines. Although the set of instruments is small, it comprises a typical assortment of tools (bone leaver, scalpels with differently shaped blades, hook and forceps) with multiple medical uses. ☉ Such basic sets of tools for a general practitioner or surgeon can also be seen on sculptural representation such as the funerary relief of a doctor mentioned above. There are several known funerary reliefs depicting physicians with medical instruments as their attributes, for example that of 'Jason, also known as Decimus, from Acharnae, a physician'. For those who could not read the inscription or decipher the image as that of a doctor examining his patient, a huge cupping vessel to the right signalled his profession. Sometimes, the tools of the doctor's manual work were further accompanied by books or scrolls to include the intellectual or philosophical side of medicine as well. The physicians in these sculptural depictions are usually represented as single figures or gently touching the patient. If doctors are shown performing some kind of operation, they are characterised as military surgeons removing arrows or dressing the wounds of warriors, often within the framework of a mythological story. ☉ Although we know from references in their writings that ancient doctors and philosophers sometimes made images of the body's inside, none of these have survived. The closest we have to ancient medical illustrations are anatomical votive offerings. The practice of leaving images of afflicted body parts in temples dedicated to gods of medicine or health was wide-spread in ancient cultures. These votives, however, usually represent easily accessible external body parts such as ears or feet. Votives of interior organs

were a peculiarity of the Etruscans, a native people in Italy who created an independent civilisation before they were colonised by the Romans from about 300 BCE on: their sanctuaries near Rome yielded hundreds of terracotta votives representing viscera of the upper and lower abdomen. Although the organs are stylised and their distribution within the image formalised, the topography of the body's interior is roughly correct and the organs' shapes recognisable. As most of the votives are made from a mould, they could be produced quickly and without much skill. However, it remains unclear how the craftsmen manufacturing the matrices gained the necessary anatomical knowledge. Were the images based on observations of animal sacrifices or dissections, or were they authored by a trained medic and then transmitted through copies? Although Hippocratic medicine developed in opposition to the belief in religious healing, it is obvious that both practices existed in parallel throughout ancient times. ◉ Despite the great social esteem and intellectual value of the medical profession, it did not become an explicit subject in Greek vase painting. That is why one of the most reproduced ancient paintings of a medical activity is a mythical scene: Achilles bandaging the wounded Patroclus. This image, however, is more a depiction of the heroes' intimate relationship than a closely observed account of how to dress a wound, as Achilles has managed to tie the bandage in such a way that both ends run in parallel and cannot be fastened in a knot! All in all, ancient vase paintings, although often a resource for many aspects of ancient life, do not yield much information on the practice of medicine. Instead, through depictions of everyday life they give us an insight into the context in which medicine was practiced.



**Attic drinking cup with Achilles and Patroclus, potter: Sosias, painter: Sosias Painter, 500 BCE**

The painting shows one of the Greek warriors in the Trojan War, Patroclus, who has been wounded by an arrow. He sits on his shield, his teeth clenched in pain and his left leg extended with his foot braced against the outline of the image, while his beloved comrade Achilles tends to his wound. The scene belongs to the narrative of the Trojan War, but does not feature in the Homeric epic 'The Iliad'.

500  
BCE

400  
BCE

300  
BCE

200  
BCE

100  
BCE

Anaxagoras 500–428 BCE

Empedocles 495–430 BCE

Democritus 460–371 BCE

Hippocrates 460–370 BCE

Corpus Hippocraticum 5<sup>th</sup> c. BCE–1<sup>st</sup> c. CE

Leucippus 5<sup>th</sup> c. BCE

Plato 429–347 BCE

Praxagoras 4<sup>th</sup> c. BCE

Diocles 4<sup>th</sup> c. BCE

Aristotle 384–322 BCE

Epicurus 341–270 BCE

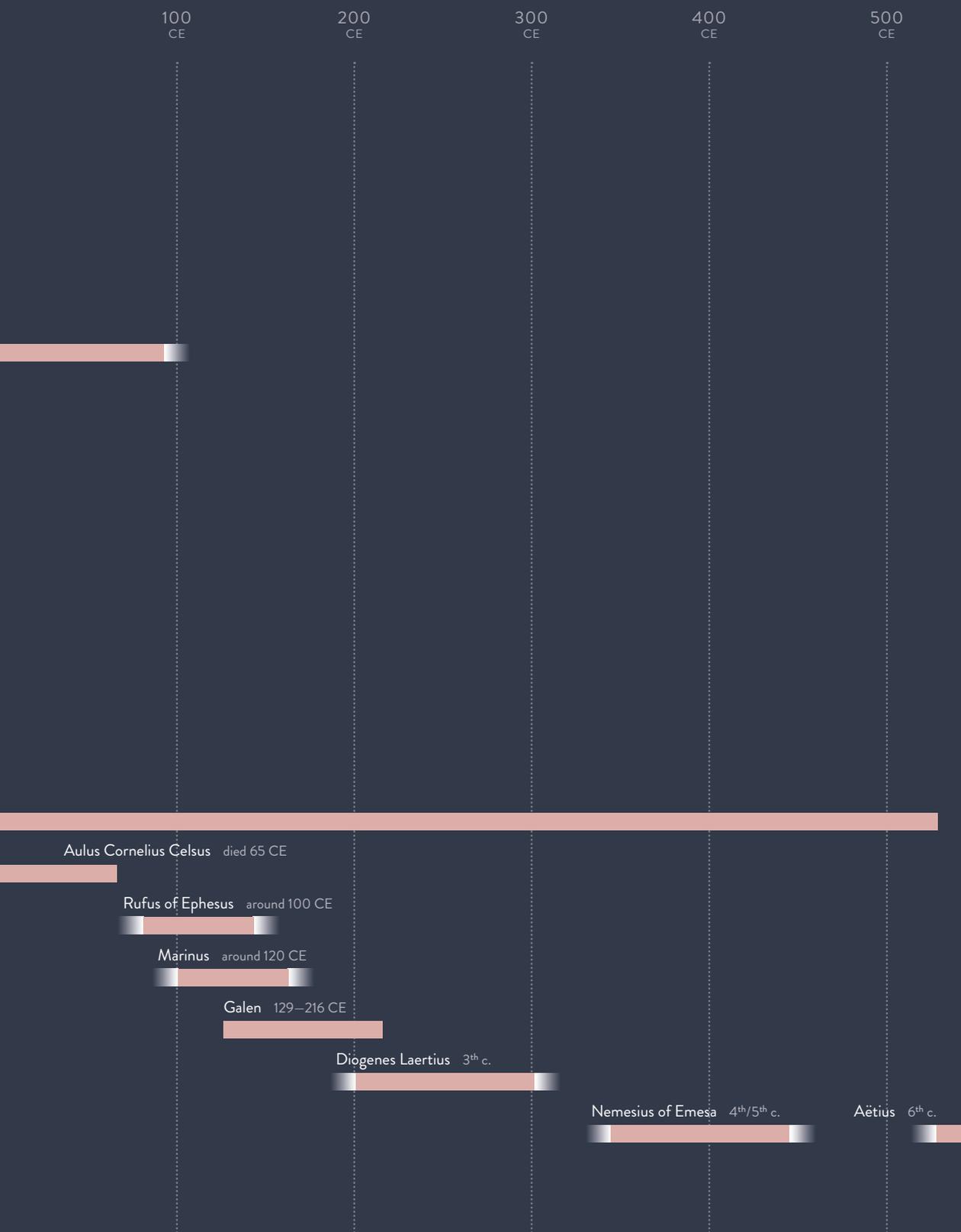
Herophilus 335–255 BCE

Erasistratus 330–250 BCE

The Stoics 300 BCE–529 CE

Chrysippus 280–208 BCE

# CHRONOLOGICAL TABLE OF AUTHORS AND SCHOOLS



## Glossary

### ACADEMY

Philosophical school founded by ☞ PLATO in Athens. Named after an area near Athens where members of the school held their meetings. Likely destroyed in 86 BCE during the Roman siege of Athens.

### AEËTIUS OF AMIDA

(6<sup>th</sup> c.) One of the first writers of a medical encyclopaedia, the sixteen 'Books on Medicine', which largely consist of excerpts and summaries from the works of earlier medical writers.

### ALEXANDRIA

Founded as a Greek city in the delta of the river Nile by Alexander the Great in 331 BCE, flourished under the rule of the Ptolemaic dynasty as centre of scientific research in Hellenistic Greece. Herophilus and Erasistratus did their anatomical dissections here.

### ANAXAGORAS OF CLAZOMENAE

(ca 500–428 BCE) Natural philosopher, influential writer on cosmology and biology.

### ANIMAL (ZŌION)

A living being; the term includes humans as well as non-human animals. In Aristotle's biology, living beings are usually distinguished from plants by their capacity to perceive and move. Human beings were considered animals with the additional capacity of rational thought. Matters related to human anatomy and physiology were included in Aristotle's writings on animals.

### ARISTOTLE OF STAGIRA

(384–322 BCE) Philosopher and natural scientist, studied in PLATO'S ☞ ACADEMY and later founded his own school, the

Lyceum. Followers of his school came to be known as ☞ PERIPATETICS. Believed that the heart was the organ responsible for thought, sensation and movement, and considered the brain as an organ for cooling the innate heat.

### AVICENNA OR IBN SINA

(ca 980–1037) Persian medical writer and natural philosopher. His five-volume medical encyclopedia, 'Canon of Medicine', was largely influenced by ancient medicine, mainly the writings of Galen.

### CARDIOCENTRISM

From *kardia*, 'heart'. The view that the ruling part of the soul, the ☞ HĒGEMONIKON, is localised in the heart.

### CELSUS, AULUS CORNELIUS

(died 65 CE) Roman author of an encyclopaedia covering a variety of subjects such as medicine, literature, agriculture, law, military tactics. The part on medicine is the only one to survive in its entirety and is a major source for medical views in the early Roman empire.

### COMMANDING FACULTY

☞ HĒGEMONIKON

### CHRYSIPPUS OF SOLI

(ca 280–208 BCE) Third head of the Stoic school, from 232 BCE until his death. One of ☞ STOICISM'S most prominent philosophers.

### DEMOCRITUS OF ABDERA

(ca 460–371 BCE) Pioneering natural philosopher with a wide interest in the causes of natural and biological phenomena. Founder of 'atomism', which held that reality consists of 'atoms', literally, un-cuttable pieces of matter.

**DIET/DIETETICS, OR REGIMEN**

The part of medicine related to lifestyle and the management of eating, drinking, exercise, baths, sleep, massages, sexual activity, etc. Used both for the preservation and enhancement of health, and for the treatment of disease.

**DIOCLES OF CARYSTUS**

(4<sup>th</sup> c. BCE) Greek medical writer, known as ‘the younger Hippocrates’, especially influential for his views on dietetics and nutrition.

**DIOGENES LAERTIUS**

(3<sup>rd</sup> c.) His biographical work ‘Lives and Opinions of Eminent Philosophers’ is an important source for the views of the ☞ STOICS.

**DISEASE (NOSOS)**

Unnatural state of the body. Various described as an imbalance of bodily constituents, or as abnormal or impaired bodily and cognitive function.

**DISSECTION**

Scientific practice of cutting open dead animals in ancient times for anatomical or physiological investigation.

**ELEMENT (STOICHEION)**

Originally ‘letter of the alphabet’; by the time of ☞ DEMOCRITUS and ☞ PLATO it became a technical term for the fundamental constituents of a thing. The elements came to be identified with earth, water, fire and air.

**EMPEDOCLES OF ACRAGAS**

(ca 495–ca 430 BCE) Sicilian philosopher, physician and poet. Believed all things, including the soul, were made up of proportions of four ☞ ELEMENTS earth, water, fire and air; attributed a major cognitive role to the blood.

**ENCEPHALOCENTRISM**

From *enkephalos*, the brain, literally: ‘what is within the head’. The view that the soul’s commanding faculty, the ☞ HÉGEMONIKON, is localised in the brain.

**EPICURUS**

(341–270 BCE) Greek philosopher and founder of the school of philosophy called Epicureanism, which emphasises that pleasure and a well-balanced life are the chief goods in life. In science, Epicureans believed in strict empiricism.

**ERASISTRATUS OF CEOS**

(ca 330–ca 250 BCE) Greek physician in Alexandria. Likely to have studied anatomy by dissection and vivisection, probably of humans as well as animals. He explored the brain, identified the cerebrum and cerebellum, the valves of the heart and the nerves. He may also have differentiated between motor and sensory nerves. Like ☞ HEROPHILUS, he considered the nerves to be vessels containing psychic ☞ PNEUMA.

**GALEN OF PERGAMUM**

(129–ca 216). Physician, prolific medical writer and commentator on the works of earlier doctors, many of whom we know mainly through Galen. In 157, appointed physician to the gladiators of Pergamum, in 169 became court physician to the Roman emperors. Galen stressed the importance of experiment and logic, and his research extended into physiology, pathology, pharmacology and anatomy. Like ☞ PLATO, he also believed in a tripartite soul.

**HEALTH (HYGIEIA)**

Natural, orderly or ideal state of the body. Described as balance of bodily constituents and normal bodily and cognitive function and behaviour.

### HÊGEMONIKON

The 'ruling' part of the soul, which is responsible for co-ordinating sensation, movement and desire; also carries out the functions of memory, imagination and thinking.

### HEROPHILUS OF CHALCEDON

(ca 335–ca 255 BCE). Student of ☞ PRAXAGORAS, physician in Alexandria. Likely to have studied anatomy by dissection and vivisection, probably of humans as well as animals. He made detailed observations of the eye, and is likely to have been the first to discover the nerves and their origin in the brain. Like ☞ ERASISTRATUS, Herophilus considered the nerves to be vessels containing PSYCHIC ☞ PNEUMA. He continued ☞ PRAXAGORAS' inquiry into the pulse.

### HIPPOCRATES OF COS

(ca 460–ca 370 BC). Physician and medical teacher, whose fame already spread during his lifetime and whose teaching was known to ☞ PLATO and ☞ ARISTOTLE. Many medical treatises were attributed to him in antiquity (☞ HIPPOCRATIC CORPUS), yet there is no absolute certainty about his specific doctrines. He was held in the highest regard by ☞ GALEN.

### HIPPOCRATIC

Term used to refer to the ideas or the authors of texts preserved in the ☞ HIPPOCRATIC CORPUS. 'Hippocrates' (in inverted commas) is used to refer to the authors of Hippocratic texts.

### HIPPOCRATIC CORPUS

(5<sup>th</sup> c. BCE–1<sup>st</sup> c. CE) A collection of more than 60 medical writings transmitted under the name of ☞ HIPPOCRATES, but probably written by a number of different authors, some of whom may

have been students of Hippocrates (☞ HIPPOCRATIC); other texts are clearly of much later date. The Hippocratic texts are connected by the rejection of magical medical practices, and by a common belief that diseases can be explained by natural causes.

### HOMER

Ancient Greek poet. If he was a historic person, he probably lived in the second half of the 8<sup>th</sup> or first half of the 7<sup>th</sup> century. His 'Iliad' and 'Odyssey' are the first known products of European literature and an important source on early Greek culture and thinking.

### HUMOURS

Moistures or liquid substances in the body, which were believed to play an important role in the physiology and pathology of the body. The doctrine of 'the four humours', i.e. blood, phlegm, yellow and black bile, was first set out in the 'Hippocratic' work 'On the Nature of Man' (ca 400 BCE); in its own time, it was just one among many different humoral theories, but from Galen onwards it became the canonical physiological theory underlying the influential doctrine of the four 'temperaments' in late antiquity and the Middle Ages.

### KRASIS

Refers to mixture or blend of ☞ ELEMENTS or elementary qualities (hot, cold, dry and wet) in a body or body part. A balanced mixture was necessary for proper bodily and cognitive function. *Dyskrasia* was seen as a cause of malfunction.

### LEUCIPPUS

(5<sup>th</sup> c. BCE) Greek philosopher, early believer in 'atoms' as the smallest unit of the world, said to be ☞ DEMOCRITUS' teacher.

**MARINUS OF ALEXANDRIA**

(around 120 CE) Roman physician and anatomist, probably  $\xi$  GALEN's teacher. Established the importance of muscles in animal movement.

**NEMESIUS OF EMESA**

(4<sup>th</sup>/5<sup>th</sup> c.) Christian bishop and author of a treatise 'On the Nature of a Human Being'. In this work, Nemesius synthesised Greek philosophical, medical and Christian views on the nature of human beings – including physiology, psychology, and the emotions – and their place in creation. The work was used as a source by medieval writers.

**NEURON, NEURA**

Originally referred to any stringy tissue in the body, such as sinews, tendons, ligaments or nerves. The word came to refer to what we call 'nerves' today after the anatomical investigations of  $\xi$  HEROPHILUS and  $\xi$  ERASISTRATUS. *Neura* were considered channels containing  $\xi$  PSYCHIC PNEUMA and distinguished into sensory and motor kinds.

**ORGAN (ORGANON)**

Literally 'instrument' or 'tool'. With  $\xi$  ARISTOTLE, it came to refer to bodily parts used by the soul to exercise its functions.

**PERIPATETIC**

From *peripatos*, 'walking around'. Of or relating to  $\xi$  ARISTOTLE's school of philosophy, named for the fact that Aristotle used to walk about while teaching.

**PHRĒN, PHRENES**

The diaphragm or midriff, which according to some thinkers was the place where intelligence (*phronēsis*) was located.

**PHYSIOLOGY**

The scientific study of the natural functioning of living bodies.

**PLATO OF ATHENS**

(ca 429–347 BCE) Philosopher, student of Socrates and founder of the  $\xi$  ACADEMY. Discussed the soul and its relationship to the body in many of his dialogues, especially the 'Timaeus' and the 'Phaedo'. He believed in a tripartite soul, and that these parts were located in different bodily regions.

**PNEUMA**

Originally 'air in movement', 'wind', or 'breath', later 'spirit'. In medicine it referred to a kind of warm air in the body. Responsible for communication between the parts of the body and the commanding faculty of the soul. Sometimes distinguished into vital, psychic and innate *pneuma*. VITAL PNEUMA (*pneuma zōtikon*) was responsible for non-voluntary functions like nutrition and growth. PSYCHIC PNEUMA (*pneuma psychikon*) was responsible for voluntary functions such as movement as well as perception and thought. Innate *pneuma* (*symphyton pneuma*), especially in the philosophy of Aristotle, was *pneuma* generated within an animal through the heating of blood in the heart, which was then distributed to the parts of the body through the blood vessels.

**PRAXAGORAS OF COS**

(4<sup>th</sup> c. BCE) Physician and teacher of  $\xi$  HEROPHILUS. He was the first to distinguish arteries and veins, and believed that the veins carried blood, while the arteries carried  $\xi$  PNEUMA. He also believed the arteries had a movement distinct from the heart, the pulse.

**PSYCHĒ**

$\xi$  SOUL

### PSYCHIC SUBSTANCE

A kind of material, such as *pneuma* or blood, used by the ☞ SOUL to carry out its functions.

### QUSTA IBN LUQA

(820–912 CE) Medieval Arabic physician and natural philosopher. Prolific author and translator, especially in medicine. In his treatise ‘On the Difference between the Soul and the Spirit’, he contrasted the immaterial soul and the material vital spirit, the latter being responsible for life, sensation and motion.

### REGIMEN

☞ DIET

### RULING PART OF THE SOUL

☞ HÉGEMONIKON

### RUFUS OF EPHESUS

(ca 100 CE) Physician. Worked within the Hippocratic tradition. Wrote widely on medical practice, regimen, anatomy, and pathology. He is well known for his writings on melancholy and hydrophobia (known today as rabies).

### SOUL (PSYCHÉ)

That which provides a body with life. Responsible for the vital capacities of sensation, movement and thought, and in Aristotle also for nutrition.

☞ HÉGEMONIKON

### STOICISM

Philosophical school founded by Zeno of Citium (ca 333–262 BCE) in the late 4<sup>th</sup> c. BCE in Athens, named after the colour-painted porch (the *stoa poikilê*) where he held his lessons. Another prominent STOIC was ☞ CHRYSIPPUS of Soli. The Stoics identified the SOUL with ☞ PNEUMA which extended throughout the body like the tentacles of an octopus or spider’s web. They taught that the

eradication of passions would lead to a healthy soul and was also beneficial to the body. Dissolved when all non-Christian philosophical schools were closed in 529 CE.

### VENTRICLES

Hollow spaces or chambers in the heart or brain. They were thought to contain different vital and ☞ PSYCHIC SUBSTANCES.

### VESALIUS, ANDREAS

(1514–1564) Flemish physician, anatomist. His very influential work on human anatomy, *De humani corporis fabrica* (*On the Fabric of the Human Body*), based on his own dissections and anatomical investigations, is a critical discussion and re-examination of the anatomical writings by Aristotle and Galen, pointing out some of their mistakes.

### VIVISECTION

Scientific practice of cutting open living animals or humans for anatomical and physiological investigation. Notably performed on humans by ☞ HEROPHILUS and ERASISTRATUS.

### VOTIVE

Offering left at healing sanctuaries as a plea for divine medical help or as an expression of thanks for such help received.

## Catalogue of Images

### Body, Soul and Life in Ancient Medicine

**Attic water jug (*hydria*) with octopus and fish, ca 500 BCE.** Height 25.7 cm, Akademisches Kunstmuseum Bonn, photo: Jutta Schubert.

**Charon fetches a soul for the underworld, Attic oil flask (*lekythos*), attributed to the so-called Sabouroff Painter, ca 440 BCE.** Height 37.7 cm, Antikensammlung, Staatliche Museen zu Berlin, Stiftung Preußischer Kulturbesitz, Inv. No. V.I. 3137, photo: Johannes Laurentius.

### Dissection as a Method of Discovery

**Pig in preparation for vivisection, from: Andreas Vesalius, *De humani corporis fabrica*, Basel 1543, p. 661.** Universitätsbibliothek Basel, AN I 15, photo: Universitätsbibliothek Basel, e|rara.ch.

**Barbary macaque (*macaca sylvanus*), taxidermy, 2015.** Height with pedestal 70 cm, Michael Dittert, Kolbermoor. This animal came from captive breeding and died of natural causes.

### Localising the Soul in the Body

**Votive of a male torso, Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE.** From Veii, terracotta, height 16.9 cm, Antikensammlung der Justus-Liebig-Universität Gießen, Sammlung Stieda, Inv. No. T-III.9, photo: Matthias Recke.

**Votive of a male torso, Etruscan, 2<sup>nd</sup> c. BCE/2<sup>nd</sup> c. CE.** From Veii, terracotta, height 69 cm, Science Museum, London, Inv. No. A634998, photo: Wellcome Images, L0058445.

**Two fragments of polyvisceral votive plaques, Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE.** From Veii, terracotta, height 14.4 and 11.5 cm, Antikensammlung der Justus-Liebig-Universität Gießen, Sammlung Stieda, Inv. No. T-III.34 and T-III.33, photo: Matthias Recke.

### Brain and Heart as Organs of the Soul

**Votive of a heart, Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE.** From Veii, terracotta, diameter 7.6 cm, Antikensammlung der Justus-Liebig-Universität Gießen, Sammlung Stieda, Inv. No. T-III.18, photo: Matthias Recke.

**Votive of a female torso (damaged), Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE.** From Veii, terracotta, height 57.3 cm, Antikensammlung der Justus-Liebig-Universität Gießen, Sammlung Stieda, Inv. No. T-III.37, photo: Matthias Recke.

**Trepanation drills, Roman, ca 100 CE.** Bronze, length 5.5 cm, diameter 2.5 cm, Historisches Museum am Strom Bingen, photo: Römisch-Germanisches Zentralmuseum, Mainz. On view in the exhibition: resin replicas, Historisches Museum am Strom, Bingen.

**Illustration of the human brain in a manuscript anthology, ca 1310.** Cambridge University Library, MS Gg.1.1, f. 490v, photo: Cambridge University Library.

## Substances in Service of the Soul

**Cupping vessels and a bronze stand, Roman, ca 100 CE.** Copper alloy, height of stand 20.5 cm, height of vessels 12 cm, diameter 4.3 cm, Historisches Museum am Strom, Bingen, photo: Römisch-Germanisches Zentralmuseum, Mainz. On view in the exhibition: resin copies, Römisch-Germanisches Zentralmuseum, Mainz.

**Attic drinking cup (*kylix*) with fighting warriors, so-called Triptolemos Painter, potter: Euphronios, 490–480 BCE.** From Orvieto, height 9 cm, diameter with handles 29.6 cm, Antikensammlung der Universität Leipzig, Inv. No. T 513, with a fragment from Universitätsammlung Erlangen, Inv. No. 368; photo: Marion Wenzel.

**Scalpel for opening veins (phlebotome), with cauterium, 200/250 CE.** From Ephesus, copper alloy, iron, length 13.6 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O.37839, photo: RGZM/S. Steidl.

## Physiology of Perception

**Cataract needle, 200/250 CE.** From Ephesus, copper alloy, length 16.2 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O.37841, photo: RGZM/S. Steidl.

**Illustration of senses and faculties of brain function, drawing in: Gerardus Harderwyck, *Epitomata seu Reparationes totius philosophiae naturalis Aristotelis*, Cologne 1496.** Pen and ink drawing, Wellcome Library, London, EPB Incunabula 2.b.5 (SR), photo: Wellcome Images, L0060688.

**Drawing in a manuscript copy of Aristotle's *De anima*, written and illustrated by Johann Lindner, 1472–1474.** Pen and ink drawing, Wellcome Library, London, MS. 55, fol. 93r, photo: Wellcome Images, L0044182.

## Reproduction and the Soul

**Votive of a uterus with urinary bladder, Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE.** From Veii, terracotta, height 16.2 cm, Antikensammlung der Justus-Liebig-Universität Gießen, Sammlung Stieda, Inv. No. T-III.35, photo: Matthias Recke.

**Vaginal speculum, 1<sup>st</sup>/2<sup>nd</sup> c. CE.** From Asia Minor, copper alloy, height 19.4 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O.38171, photo: RGZM/S. Steidl.

## Nutrition, Life and Health of the Ensouled Body

**Fragment of a votive of the lower abdomen, Etruscan, 4<sup>th</sup>/3<sup>rd</sup> c. BCE.** From Veii, terracotta, height 10.4 cm, width 18 cm, Antikensammlung der Justus-Liebig-Universität Gießen, Sammlung Stieda, Inv. No. T-III.10, photo: Matthias Recke.

**Attic drinking cup (*kylix*) with symposium, painter: Makron, potter: Hieron, ca 490 BCE.** From Cerveteri, height 11.9 cm, diameter with handles 36.4 cm, Antikensammlung der Universität Leipzig, Inv. No. T3367, photo: Marion Wenzel.

**Attic drinking cup (*kylix*) with symposium, attributed to the Brygos Painter, ca 490 BC.** From Capua, height 14.2 cm, diameter 25.5 cm, Antikensammlung, Staatliche Museen zu Berlin, Stiftung Preußischer Kulturbesitz, Inv. No. F2309, photo: Johannes Laurentius.

**Lithotomy scoop and scalpel (blade missing), 200/250 CE.** From Ephesus, copper alloy, length 16.9 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O.37830, photo: RGZM/S. Steidl.

### Movement as a Sign of Life

**Fragment of a marble sculpture, Hellenistic, ca 2<sup>nd</sup> c. BCE.** Height 68.6 cm, depth 20.5 cm, Antikensammlung der Universität Leipzig, Inv. No. 99.032, photo: DAI Objects/Arachne, FA-S4108-1\_80529-06, <http://arachne.uni-koeln.de/item/marbilder/1421377>.

**Panathenaic prize amphora, attributed to the Berlin Painter, ca 470 BCE.** From Nola, height 63 cm, Antikensammlung, Staatliche Museen zu Berlin, Stiftung Preußischer Kulturbesitz, Inv. No. F1832, photo: Johannes Laurentius.

**Attic drinking cup (*kylix*) with runners, in the manner of the Antiphon Painter, potter: Euphronios, ca 480 BCE.** From Cerveteri, diameter with handles 31 cm, height 8.9 cm, Antikenmuseum der Universität Leipzig, Inv. No. T3364, photo: Marion Wenzel.

**Fragment of an Attic drinking cup with athletes, so-called Boot Painter, ca 460 BCE.** Gift from E.P. Warren, diameter 16.5 cm, Antikenmuseum der Universität Leipzig, Inv. No. T3591, photo: Marion Wenzel.

### Diseases of the Soul, Insanity and Mental Health

**Funerary relief for a physician, 1<sup>st</sup> c. BCE / 1<sup>st</sup> c. CE.** Marble, height 67 cm, width 84 cm, Antikensammlung, Staatliche Museen zu Berlin, Stiftung Preußischer Kulturbesitz, Inv. No. Sk 804, photo: Johannes Laurentius. On view in the exhibition: plaster cast of Sk 804, painter's model, 20<sup>th</sup> c., Gipsformerei der Staatlichen Museen zu Berlin, Stiftung Preußischer Kulturbesitz, Inv. No. 1436.

### Scalpels and cylindrical box for medical instruments, various probes, hooks, tweezers, 1<sup>st</sup> c. BCE / 2<sup>nd</sup> c. CE and modern replicas:

- a) Scalpel, shape: Roman, 1<sup>st</sup> c. BCE – 2<sup>nd</sup> c. CE. Allegedly from Cos, copper alloy, iron, length 15.4 cm, Sammlung Meyer-Steineg, Friedrich-Schiller-Universität Jena, Inv. No. 10; and modern replica, no Inv. No., photo: Andreas Christoph.
- b) Modern replica of a scalpel from the doctor's grave in Bingen, Roman, end of the 1<sup>st</sup> c./beginning of the 2<sup>nd</sup> c. CE (made by Holger Ratsdorf, 2016). Brass, steel, length 15.3 cm, photo: Uta Kornmeier.
- c) Cylindrical box for medical instruments, 1<sup>st</sup>/2<sup>nd</sup> c. CE. From Asia Minor, copper alloy, length 21.7 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O. 38360, photo: RGZM/S. Steidl.
- d) Long tweezers with flat ends, 1<sup>st</sup>/2<sup>nd</sup> c. CE. From Asia Minor, copper alloy, length 14.3 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O.38314, photo: RGZM/S. Steidl.

- e) Fish-shaped spatula probe, 1<sup>st</sup> c. CE. From Asia Minor, copper alloy, length 17.7 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O.38260, photo: RGZM/S. Steidl.
- f) Urological double probe, 200/250 CE. From Ephesus, copper alloy, length 15.9 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O.37854, photo: RGZM/S. Steidl.
- g) Long tweezers with serrated ends and sliding clamp, 1<sup>st</sup>/2<sup>nd</sup> c. CE. From Asia Minor, copper alloy, length 15.5 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O.38315, photo: RGZM/S. Steidl.
- h) Double hook, 2<sup>nd</sup> c. CE. From Asia Minor, copper alloy, length 17.5 cm, Römisch-Germanisches Zentralmuseum, Mainz, Inv. No. O.38217, photo: RGZM/S. Steidl.
- i) Tweezers (modern copy), shape: Roman, 1<sup>st</sup> c. BCE / 2<sup>nd</sup> c. CE. Allegedly from Cos, copper alloy, length 13.7 cm, Sammlung Meyer-Steineg, Friedrich-Schiller-Universität Jena, Inv. No. 7, photo: Andreas Christoph.

**Three instrument handles with sockets, insertable tweezers and hook, 2<sup>nd</sup>/1<sup>st</sup> c. BCE or modern replicas.**

Allegedly from Cos, copper, Sammlung Meyer-Steineg, Friedrich-Schiller-Universität Jena, Inv. No. 45 (handle with pestle), length 5.6 cm; Inv. No. 44 (handle with tiny scoop), length 7.9 cm; Inv. No. 43 (handle with spatula), length 7.8 cm; Inv. No. 41 (hook), length 7.9 cm; Inv. No. 42 (tweezers), length 7.9 cm; photo: Andreas Christoph.

**Sources of Ancient Medicine**

**Papyrus fragment of the 7<sup>th</sup> book of Galen's *De placitis Hippocratis et Platonis*, front and back, 3<sup>rd</sup> c. CE.** Papyrussammlung Berlin, Inv. No. P 21141, photo: Ägyptisches Museum und Papyrussammlung, Staatliche Museen zu Berlin, Stiftung Preußischer Kulturbesitz.

**Manuscript of Galen's *De placitis Hippocratis et Platonis*, fol. 61r, 13<sup>th</sup> c.** Bombycin paper, Staatsbibliothek zu Berlin, Stiftung Preußischer Kulturbesitz. Ham. 270, photo: Staatsbibliothek zu Berlin.

**Galen, *Opera omnia*, Venice 1556, title page.** Woodcut, Wellcome Library, London, photo: Wellcome Images, L0005026.

**Funerary relief for the physician Jason, ca 100 CE.** From Athens, marble, height 80 cm, width 55.9 cm, British Museum, London, Inv. No. 1865,0103.3, photo: © Trustees of the British Museum.

**Doctor aiding a wounded warrior, part of a funerary relief, Roman, 1<sup>st</sup> c. CE.** From Cologne, marble, Römisch-Germanisches Museum Köln, photo: © Rheinisches Bildarchiv Köln, A. Wegner.

**Attic drinking cup (*kylix*) with Achilles and Patroclus, painter: Sosias Painter, potter: Sosias, 500 BCE.** From Vulci, height 10 cm, diameter 32 cm, Antikensammlung, Staatliche Museen zu Berlin, Stiftung Preußischer Kulturbesitz, Inv. No. F 2278, photo: Johannes Laurentius.

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**HOMER** What happens to the soul after death *Odyssey* II, 218-222, translation after Augustus T. Murray.

### Dissection as a Method of Discovery

**CELSUS** Herophilus' and Erasistratus' use of vivisection *De medicina*, prooemium 24. *On Medicine*, translation William G. Spencer.

**GALEN** Book knowledge must be supplemented by autopsy *De anatomicis administrationibus* 1.2. *Anatomical Procedures*, translation Charles J. Singer.

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**GALEN** On vivisection of apes *De anatomicis administrationibus* 9, ch. II. *Anatomical Procedures*, translation Wynfrid L.H. Duckworth.

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**CHRYSIPPUS** An argument that the soul's commanding faculty is located in the heart *De placitis Hippocratis et Platonis* 2.2.9-10. *The Doctrines of Hippocrates and Plato*, translation after Phillip De Lacy.

**GALEN** The tripartite soul *De placitis Hippocratis et Platonis* 7.3.2-3. *The Doctrines of Hippocrates and Plato*, translation after Phillip De Lacy.

### Brain and Heart as Organs of the Soul

**ARISTOTLE** The primary sense-organ is localised in the heart *De juventute et senectute* 3, 469a10-12. *Youth and Old Age*, translation after William S. Hett.

**ARISTOTLE** The brain is an organ for cooling the blood *De partibus animalium* 2.7, 652b15-20. *The Parts of Animals*, translation William Ogle.

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**ARISTOTLE** Epigenesis or the builder model *De generatione animalium* 2.4, 740b21-741a5. *The Generation of Animals*, translation Arthur Platt.

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### FURTHER READING BY TOPIC

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**JAN N. BREMMER**

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### CHRISTOPHER GILL

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**CHRISTOPH GEIGER** is freelance illustrator, exhibition designer and interaction designer. He graduated at the University of the Arts Bremen in 2011. His main interest is knowledge transfer. He works with a mix of analog and digital media.

**RICARDO JULIÃO** graduated in Philosophy at the New University of Lisbon. Since 2013 he has been a Topoi doctoral fellow at Humboldt-Universität zu Berlin. His dissertation aims at mapping the role of memory in Galen's oeuvre. In it he researches Galen's conception of memory, how it is related to other psychic faculties and what role it plays in epistemology, ethics and medicine.

**MARCEL KLOTZ** studied Philosophy and Political Science at the Martin-Luther-University Halle-Wittenberg and moved to Humboldt-Universität zu Berlin for further studies in Philosophy. His main focus in research is the conceptions of Aesthetics in the early German Enlightenment movement.

**UTA KORNMEIER** graduated in Museum Studies at the University of London. Since obtaining her PhD in the History of Art at Humboldt-Universität zu Berlin in 2003 she has been working in museums and research institutions in Germany and the UK. She co-ordinated the research project 'SchädelBasisWissen. Kulturelle Implikationen der plastischen Chirurgie des Schädels' at the Centre for Literary and Cultural Research in Berlin.

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**CHIARA THUMIGER** obtained her PhD in Classics at King's College London in 2004 on the topic of Greek tragedy and the representation of character. From 2010–15, she was a research associate of the Alexander von Humboldt Professorship of Classics and History of Science at Humboldt-Universität zu Berlin. She currently holds a Wellcome Trust research fellowship in the history of medicine at Warwick University. Her current research explores ancient medical and literary ideas on mental health, and their relevance to the history of psychiatry.

**RUTI UNGAR** obtained her PhD in History from Humboldt-Universität zu Berlin in 2010. Her research interests include history of the body, popular culture and Jewish history, subjects on which she has curated several exhibitions and published books and articles. She is co-ordinator of Area D, 'Theory and Science' at the Excellence Cluster Topoi.

## Acknowledgements

Many people and institutions have contributed to the realisation of the exhibition and the associated book. We wish to express our special thanks to those institutions, collections, museums and private owners, which/who have supported the presentation with their generous loans:

- Antikenmuseum der Universität Leipzig
- Antikenseammlung der Justus-Liebig-Universität Gießen
- Gipsformerei der Staatlichen Museen zu Berlin, Stiftung Preußischer Kulturbesitz
- Historisches Museum am Strom, Bingen
- Medizinhistorische Sammlung Meyer-Steineg, Friedrich-Schiller-Universität Jena
- Michael Dittert, Kolbermoor
- Römisch-Germanisches Zentralmuseum, Mainz

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Typography and cover design:  
Stephan Fiedler and Eva-Maria Bolz

Illustration and cover illustration:  
Christoph Geiger

ISBN 978-3-9817965-0-6  
First published 2016

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# Imprint

Publication in association with ‘The Soul is an Octopus. Ancient ideas of life and the body’, an exhibition at the Berlin Museum of Medical History, Charité, by the Excellence Cluster Topoi – The Formation and Transformation of Space and Knowledge in Ancient Civilizations of Freie Universität Berlin and Humboldt-Universität zu Berlin, and the Alexander von Humboldt Professorship of Classics and History of Science at Humboldt-Universität zu Berlin

With the support of the Schering Foundation and the Alexander von Humboldt Foundation

## EXHIBITION

Duration

**II. 5.–II. 9. 2016**

Curator

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**ORLY LEWIS**

**CHIARA THUMIGER**

Exhibition texts

**UTA KORNMEIER**

Exhibition technology

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Exhibition co-ordination

**RUTI UNGAR**

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Design

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Image and citations research

**MARCEL KLOTZ**

**PINAR BOGA**

Proofreading

**CHRISTINE SALAZAR**

Printing

**DK DRUCKHAUS KÖTHEN**



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**THE SOUL IS AN OCTOPUS** In antiquity, doctors and philosophers identified the physical body as the space in which life was located and originated. They used the word *psychê* or 'soul' to refer to the force inspiring, organising and energising the body. It was the soul that provided living beings with the structures and functions enabling them to live, grow, develop and exercise the full range of their natural capacities. © This book is a companion to the exhibition 'The Soul is an Octopus' at the Berlin Museum of Medical History at the Charité. It provides an introduction to ways of thinking about life, body and the soul in antiquity. It presents ancient texts, images and objects that allow us a glimpse into the fascinating world of anatomy, physiology and medicine as conceived by philosophers and physicians roughly 2,000 years ago.