

Vivisection Ancient and Modern¹

Gary Ferngren

Oregon State University (USA)

1500 SW Jefferson St. Corvallis, OR 97331

FSAEI HE I.M. Sechenov First MSMU MOH Russia (Sechenov University)

8 Trubetskaya St., building 2, Moscow 119991, Russia

This paper addresses the debate over the practice of human vivisection, most notably as practiced in the ancient world by the Alexandrian physicians Herophilus and Erasistratus. No issue in Greek medicine attracted more intense dispute in the classical world than did vivisection, on the ethics of which Greek physicians were divided. Moreover, there was a widespread, culturally rooted repugnance towards experimentation on the human body in ancient Greek and Roman society, which applied to dissection of cadavers as well as vivisection, and hampered the development of scientific progress in medical care. Patients neither expected nor desired their physicians to be what we call “scientists” today; they expected care based on a theoretical rather than experimental understanding of the body. While the practice of vivisection was debated by the medical sects of the Dogmatists and the Empiricists, public hostility to vivisection never diminished and it fueled an already-existing popular criticism of physicians. The issue became the focus of Pseudo-Quintilian’s *Declamation 8*, a rhetorical exercise in which the father of twins consents for one son to be vivisected to save the life of the other. The declamation explores the ethical issues in a detailed manner that, while fictional, is unparalleled in classical medical literature. The paper goes on to survey vivisection in the modern world by briefly examining its use by German and Japanese physicians prior to and during World War II. Independently of each other, German and Japanese military leaders spearheaded medical research programs in which prisoners were vivisected by surgeons in training or exposed to life-threatening conditions in studies of the human body’s response to various stresses. Although the goal of such research was in part the improvement of medical care for German and Japanese soldiers, scholars today question the scientific validity of the experiments based both on the haphazard record-keeping of the programs and on ethical dilemmas concerning the use of the resultant data. The paper concludes by describing a medical controversy analogous to but milder than vivisection, concerning children known as “saviour siblings”, who are conceived for the express purpose of subsequently bequeathing their organs or cells to a genetically related sibling who suffers from a fatal disease.

Keywords: *Vivisection, dissection, Alcmaeon, Herophilus, German and Japanese vivisection, saviour siblings*

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About the author

Gary Ferngren – Doctor of Philosophy, Professor at the School of History, Philosophy, and Religion at Oregon State University (USA) and the Department of the History of Medicine, National History and Culturology at FSAEI HE I.M. Sechenov First MSMU MOH Russia (Sechenov University). E-mail: gferngren@oregonstate.edu

The¹ development of professional medicine in the ancient world was hampered by a number of factors. In ancient near-eastern societies (such as Egypt and Mesopotamia) medicine was hindered by the fact that most physicians were little more than empirics, who treated symptoms but had

little understanding of the internal causes of disease. Moreover, they never broke completely free of a belief in the divine aetiology of disease, and hence they mixed supernatural with empirical therapeutics.²

In Greece, it was not until the time of Hippocrates (c. 460 – c. 380 BCE) that medicine began to acquire a theoretical framework, with the introduction of medical theory in the fifth century BCE. Until then Greek medicine was also largely empirical. With the introduction of medical theory, Greek medicine was, throughout

¹ In this article, I distinguish between vivisection and experimentation on human subjects that does not involve the dissection of a living human (a distinction not always made in discussions of Japanese and German medical experiments).

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² For a general treatment see: [1, pp. 14–35].

most of antiquity, based on humoralism, which was formulated by Empedocles. According to this theory the body contained four fluids (blood, phlegm, yellow bile, and black bile) that produced four qualities (warmth, cold, wetness, and dryness). Health resulted from a harmonious blending (*κρᾶσις*) of the humours, while disease was caused by their disturbance or imbalance. Treatment consisted in creating an individual regimen of hot or cold foods that would counterbalance the disease with a contrary, together with drugs and either cautery or phlebotomy. As such it was what we would call “whole-person medicine”. There was little interest in medical research or experimentation. Moreover, the Greeks and Romans did not believe in the possibility of scientific progress in anything like the modern sense. Ancient physicians did not possess the expectation of modern scientists that medicine advances through the discovery of new knowledge. They were content to accept traditional medical theories with little or no change. Greek medical theory, in fact, grew out of philosophical speculation rather than the practice of medicine, since physicians themselves were interested mostly in treating symptoms.³

Given the fact that early medicine did not aim at healing a particular part of the body, except where wounds and broken bones were concerned, Greek physicians placed little emphasis on the importance of anatomical knowledge of the human body [7]. Some knowledge of anatomy was gained by physicians through examining war wounds; but even in the fifth century BCE there was surprisingly little interest in exploring the human body. The earliest person known in the ancient world who dissected the human body for anatomical purposes was Alcmaeon [8, p. 142], who hailed from Croton, a Greek colony in southern Italy. He probably lived in the fifth century BCE (c. 510 – c. 430 BCE). Croton was famous for its “school” of medicine, which may have been the earliest in Greece. It enjoyed the reputation of producing some of the finest physicians in Greece, such as Democedes, who enjoyed an international reputation extending to the court of the Persian king, and it was the home

of the philosopher Pythagoras, who formed a religious community of philosophers.

Alcmaeon was not, so far as we know, a physician. His interest was in philosophy, and he belonged to those philosophers whom we call the Pre-Socratics, who were interested chiefly in cosmological speculation. But he was, like many Pre-Socratics, interested in physiology, and he was the first philosopher to test his theories by dissection. In a famous case, he cut out the eye of an animal (it is not known whether it was dead or alive). He apparently wanted to observe the composition of the substances of the eye. He discovered (or perhaps inferred the existence of) the channels that connect the eye to the brain (i.e., the optic nerves). He was also interested in embryology, and he opened birds’ eggs and examined the development of the embryo. Alcmaeon was an important figure in the development of Greek medical theory and experimentation. He introduced ideas that were later elaborated on by Hippocratic writers, as well as by Plato and Aristotle.

Many of Alcmaeon’s ideas were speculative and borrowed from earlier philosophers, such as the Pythagoreans. He believed that the brain is the central organ of thought and feeling, unlike Aristotle and many other philosophers, who continued to believe that it is the heart. His most influential theory was that health is a balance or equilibrium of opposing forces in the body (e.g., warm and cold, bitter and sweet, wet and dry). He explained disease as the excess of one of these qualities or pairs of opposites, which upsets the balance. Disease might be caused by an excess or deficiency of food or by such external factors as climate, locality, fatigue, or exercise.

The Greeks performed the earliest anatomical dissections on animals. In fact, throughout antiquity, dissection for medical purposes rarely involved cadavers. Until the early Renaissance, anatomical knowledge was largely based on comparative anatomy (i.e., the dissection of animals) and on the chance observation of persons who had been wounded or injured. The Greeks had a deep-seated repugnance for the systematic dissection of human corpses, a repugnance that was based on religious and moral sensibilities. They believed that the human corpse polluted any person or object that came into contact with it. They had a dread of the

³ On medical experimentation see: [2]. Cf. [3; 4, pp. 126–169, p. 222–225; 5; 6].

cadaver and particularly of the skin, regarding the latter as inviolable and fearing to cut through it. Moreover, they believed that a soul would never be at rest until the body was given burial. This last sensibility is the main theme of Sophocles's play *Antigone* [9, pp. 225–231].

It was not until the early third century BCE that systematic human dissection became possible for the first and perhaps the only time in the ancient world. It occurred in Alexandria, Egypt. The city of Alexandria was founded by its namesake, Alexander the Great, who had left Macedonia at the head of an army of Greeks and Macedonians in 334 BCE to conquer the Persian Empire. He moved quickly through Asia Minor and down the coast of Syria-Palestine, defeating Persian armies in several battles. In 331 he entered Egypt, which the Persians surrendered without a battle. At the site of Rhakotis, on the Mediterranean coast of Egypt, he ordered his architect, Dinocrates, to construct a new port city that would connect Egypt with Macedonia.⁴

Under the patronage of the Ptolemaic dynasty of Macedonian kings (323–30 BCE), who had come to rule Egypt after Alexander's death, Alexandria became the greatest port in the Mediterranean world and a centre of scholarship and the arts. Supported by his enormous wealth, King Ptolemy II (308–246 BCE) founded a famous library, which became the largest in the Greek world, and the celebrated temple of the Muses, or Museum, at which research was carried out by outstanding mathematicians, astronomers, natural philosophers, and literary scholars who accepted Ptolemy's patronage at the Museum. Among those attracted to Alexandria were two physicians, Erasistratus and Herophilus. Herophilus, who was born in Chalcedon (330/20–260/50 BCE) in Bithynia, in Asia Minor, was a successful medical doctor who came to Alexandria to undertake anatomical research. He was attracted to Alexandria by the encouragement that the Ptolemies gave to scientific research, which could be pursued uninhibited by intellectual or cultural taboos. There is no indication that either physician was a

member of the Museum or enjoyed the financial support of the Ptolemaic court. In fact, there is no evidence that medical research was ever conducted at the Museum [10, pp. 26–27]. But Herophilus wrote, as an independent researcher, a treatise on anatomy in three books, which became authoritative and influential.

Herophilus made important discoveries in anatomy and physiology that could only have been made by means of dissection [9, p. 224]. His most outstanding achievement in anatomy was his discovery of the nerves, and his distinguishing between motor and sensory nerves. Aristotle had failed to distinguish nerves from tendons. Herophilus discovered the optic nerve, as well as at least four layers of the eye, which he named. Several parts of the body, such as the *duodenum* and the *retina*, both of which are Latin translations of the Greek names that he assigned, still retain the names he gave them. He provided the first description of the liver and the earliest examination of the pancreas. He demonstrated a detailed knowledge of both male and female reproductive systems, and he discovered the ovaries and Fallopian tubes. He regarded the brain as the center of the nervous system (thereby agreeing with Alcmaeon against Aristotle), and he described the main ventricles of the brain. He discovered the valves of the heart, while Erasistratus, who was a younger contemporary experimentalist, demonstrated that the blood flowed through them irreversibly. Herophilus's most important formulation in physiology was the theory of the pulse, which he believed had diagnostic value, and he constructed a portable adjustable clepsydra (water clock) to measure the pulse rate of his patients. It is not surprising that he has enjoyed the reputation of being the father of scientific anatomy and a pioneer in the systematic dissection of corpses. Gabriello Falloppia called Herophilus "the Vesalius of antiquity" [10, p. 181]. Early anatomists, such as Aristotle, had limited their dissection to the anatomy of the lower animals. Herophilus for the first time provided detailed accounts of the organs of human beings, which he based on the dissection of human cadavers, comparing them from time to time with those of other animals [11]. His anatomical discoveries provided a necessary basis for the future development of surgery, to which he himself, however, made only

⁴ Plutarch, *Alexander*, 26; Arrian, *Anabasis of Alexander*, 3.1.1–3.2.2; Diodorus Siculus, *Bibliotheca Historica*, 17.52; Quintus Curtius, *Historiae*, 4.8.1–6; Strabo, *Geography*, 17.6; Ammianus Marcellinus, *Res Gestae*, 22.16.7.

a limited contribution. Heinrich von Staden does not consider Herophilus a “radically innovative scientist”, but rather “a physician who in crucial respects had not emancipated himself from the Hippocratic tradition” [10, p. 427].

According to several Roman authors, such as Celsus [11], Tertullian,⁵ and Augustine,⁶ Herophilus and Erasistratus practiced not only dissection of cadavers, but also vivisection of living subjects, in Alexandria. The procedure was carried out on criminals who were supplied by the king for this purpose at the request of Herophilus. They were cut open while they were alive, and (according to Celsus) while they were still breathing, the physicians observed internal organs that had not been visible, including “their position, colour, shape, size, arrangement, hardness, softness, smoothness, relation, processes and depressions of each, and whether any part is inserted in or is received into another” [11].

The evidence (or lack of it) suggests that Herophilus and Erasistratus were the only physicians before the Renaissance to perform the systematic dissection of humans [9, p. 224]. It was possible in Alexandria largely because the Ptolemies were eager to gain a reputation as patrons of scientific research, and so permitted the two physicians to disregard the scruples that the Greeks traditionally felt about the scientific examination of the human body [10, pp. 28–30, 145–151]. It has been suggested that the fact that the Egyptians had mummified corpses for thousands of years made the practice easier than it would have been in Greece, but in reality the practice of mummification is likely to have had little or nothing to do with it. Greek physicians did not perform mummifications and Egyptian undertakers did not perform dissections or vivisections [10, pp. 29–30, 149–151; 9, p. 241].

Even though some of the most significant discoveries of Greek medicine were made during the Hellenistic period as the result of the use of dissection and perhaps vivisection, the practice of vivisection produced much emotionally charged hostility. Aristotle, who was probably

the first Greek researcher to dissect animals on a systematic basis, remarked that “it is not possible without considerable disgust to look upon the blood, flesh, bones, blood-vessels, and such-like arts of which the human body is constructed” [12]. This instinctive revulsion, which marked those who carried out the dissection of human cadavers, affected a fortiori those who practiced vivisection.

But an even greater objection was to its cruelty. No issue in medicine attracted so much ethical discussion in the classical world as did vivisection. Celsus neatly summarizes why it was so widely condemned: “But to lay open the bodies of men whilst still alive is as cruel as it is needless” [11]. Using stronger language, the second-century Christian writer Tertullian, in his treatise *On the Soul (De anima)*, describes Herophilus as “that doctor or butcher who cut up innumerable corpses in order to investigate nature and who hated mankind for the sake of knowledge”.⁷

The Greek medical profession itself became divided, on both epistemological and clinical grounds, over the practice of vivisection that Herophilus had inaugurated. There were two major medical sects, the Dogmatists and the Empiricists, which disagreed about whether vivisection was ethically permissible. The Dogmatists believed that a knowledge of the internal organs was necessary before treatment could be given, and they both advocated dissection and, in theory at least, defended vivisection [11]. But the Empiricists held that, since there were so many rival medical theories, many of them speculative, treatment ought to be based on experience rather than on enquiry into the hidden causes of disease. The Empiricists argued that experience showed which treatments had succeeded and which had failed, while conjectural medical theory led only to useless debate.⁸ Moreover, even those who practiced dissection admitted that it was a dehumanizing procedure. Along with a natural human repugnance at opening the body there existed a widespread fear of the knife, especially among the Romans. From the earliest mention of the introduction of Greek medicine to Rome in c. 219 BCE, the Romans demonstrated

⁵ *De anima*, 10. With introduction and commentary by J. H. Waszink (ed.). Amsterdam: North Holland Publishing Co., 1947. Waszink believes that Tertullian derived his information from Soranus (see pp. 22–29 and 185).

⁶ *De anima et eius origine*, 4, 3, and 6.

⁷ *De anima*, 10.

⁸ See: [11, 25–26], cf.: [11, p. 23]. A third medical sect, the Methodists, also condemned vivisection.

a sensitivity to pain induced by the scalpel that never went away.⁹ Given the widespread fear of the knife, it is not surprising that vivisection was regarded with such horror in the classical world. This revulsion, which undergirded even the practice of dissection, was an underlying factor for the almost universal condemnation of vivisection.

But another issue had considerable bearing on the question of vivisection. That was the physician's conception of duty to his art, particularly to the advancement of medicine and its ability to heal. Would the Greek or Roman physician have felt a moral or ethical imperative to engage in medical research or experimentation? The question is complex, and the answer given depended in part on the position of the respective physician in the medical hierarchy and the time and place in which he practiced. The Alexandrian physicians Herophilus and Erasistratus present a different attitude from a Greek slave practicing medicine at the behest of his Roman master. We know that experiments were performed by Greek researchers. Yet it is doubtful that the Greeks and Romans ever devised anything like a truly inductive method. In part this was due to the continuing influence of philosophy on science, which strengthened the already existing tendency in Greek thought to overvalue deduction at the expense of induction. Ludwig Edelstein was surely correct in writing that "one must not assume that the ancient physician experienced the restlessness of the modern scientist, who sees medicine as science in a perpetual process of change through one discovery after another" [13, p. 90]. Known medical researchers that we today would call "scientists" were rare.

In spite of the debate between the Dogmatists and the Empiricists, the public hostility to vivisection never diminished and it fueled the popular criticism of the medical profession. Popular condemnation of vivisection was universal among laymen. A strong antipathy even to dissection and to anatomists underlay this hostility. Augustine's attitude is typical: "With a cruel zeal for science, some medical men, who are called anatomists, have dissected the bodies of the dead, and sometimes even of sick persons who died under their knives, and have inhumanly pried into the secrets of the human body to learn

the nature of the disease and its exact seat, and how it might be cured".¹⁰

The ancients had no sympathy for a doctor who experimented on human subjects. To endanger or sacrifice a life for the advancement of medical science was to most Romans repugnant. The alleged curiosity (*curiositas*) of physicians was proverbial in antiquity. Far from being a quality that was admired in physicians, it was always viewed negatively. Thus Pliny, whose attitude toward physicians was generally hostile, nevertheless stated a popular prejudice in observing that "physicians acquire their knowledge from our dangers, making experiments at the cost of our lives".¹¹ Patients neither expected nor desired their physicians to be scientists. The physician's duty was to heal, not to discover new knowledge. A patient in the classical world would have felt victimized by a physician who sought to use his case for the advancement of medical knowledge. He did not wish to suffer risk even if the result might benefit the health of others, particularly when the risk involved a practice as brutal and repugnant as vivisection.

After Herophilus's death the traditional taboos against human dissection reasserted themselves, and systematic dissection was rarely if ever practiced again until the time of the Renaissance.¹² And, while the Dogmatists and Empiricists continued for centuries to debate the ethics of vivisection, we have no clear evidence of anyone who performed it on humans.¹³ Given the public prejudice against medical research and experimentation, it is not surprising that most physicians were reluctant to attempt even dissection, though in so doing they hindered the advancement of medicine.

We lack any descriptions of vivisection from medical literature, having only brief reference to the procedure employed by Herophilus. But there exists a fictional description from a practice exercise that was meant to train pupils for Roman law courts. Advanced declamations, called *controversiae*, were judicial orations in

¹⁰ *City of God*, 22.24.

¹¹ *Natural History*, 29.5.11.

¹² For a description of human and animal dissection and animal vivisection practices during the sixteenth and seventeenth centuries, see: [14, pp. 23–33].

¹³ There exists a reference to physicians vivisectioning a Christian for the sake of anatomical knowledge. See: [15, p. 213].

⁹ Pliny. *Natural History*, 29.6.12–13.

which an imaginary case in law was debated. These declamations, which often treated fantastic themes, were designed to test the ingenuity and eloquence of orators in training.¹⁴ One of the most interesting pieces in the large and amorphous collection of Roman declamations is the Pseudo-Quintilian Declamation 8, which L.A. Sussman dates to the second half of the second century, and hence contemporaneous with Galen.¹⁵ The theme is, typically for a declamation of this sort, far-fetched. Two brothers who are twins become ill. The parents consult physicians, who say that they suffer from the same illness but offer no hope for them. Another physician, however, says that he can cure one of the twins if he can vivisect the other.¹⁶ The father grants permission and the physician cuts open the child and examines his organs. This child dies, while the other twin recovers, and the father is charged by his wife with murder. The declamation takes the form of a speech delivered by the prosecutor in court. The most dramatic part is the description of the child's vivisection. Although it is highly rhetorical and intended to produce an effect of pathos, it is unique in its attempt to describe what was regarded in antiquity as the most horrible kind of medical experimentation, and for that reason I shall quote it at length.

The coverings are removed from his quivering limbs and in order that the violent hands might gain entry to the whole body, the wretched and pitifully lean flesh is stripped bare. Then his entire frame is laid out on the full length of the bed to be exposed to an immovable and inflexible period of endurance. The torturer takes his knife, although he does not immediately make the entire incision with his hand but, because he penetrates gently and gradually, he keeps the boy's life suspended and poised in his suffering between life and death. This was the plea, this the exhortation of the young

¹⁴ Physicians were recurring characters in Roman declamations. See: [16].

¹⁵ The most recent text is that of Håkanson L. *Declamationes XIX maiores Quintiliano falso ascriptae* [17]. An earlier text, on which my own translation, used here, is based, is edited by G. Lehnert in *Quintiliani quae feruntur declamationes (maiores)* [18]. For a detailed commentary on the text see: [19]. For an English translation see: [20]. On the dating of Declamation 8 see: [20, p. ix].

¹⁶ For an extended discussion of Roman biological understandings of the relationship of twins see: [21, pp. 118–142].

man who was about to die: “Endure it bravely, allow it patiently; my brother will be cured. It is not through fear that you have taken my life; it is not that you are lacking in anguish. Beware lest you disturb the organs by crying or disturb them by panting or groaning, lest another's remedy perish”. The poor boy endured the poking around in every area of his breast, which had been cut open, the result of that wicked deception of a fickle art. Do you think that the physician was satisfied in learning all about the man at first sight? The hands accomplished more than the knife. Repeatedly the vital organs were taken out, studied, and taken apart. The hands accomplished more than the knife. Next to the doctor stands the father, gaping at the exposed vital organs as the physician disturbs with his bloody hands the seat of the soul oozing with gore, urging him not to hurry. He orders him to investigate deeply and carefully. He questions, hesitates, affirms and accepts the reason for his son's death... The poor lad during this time was revived by draughts, he was occupied by words of encouragement. The remaining blood was stopped, and the exposed organs were closed up.... Do you think that the physician investigated only the causes of this sickness? [No, rather] he investigated whatever he did not know and, having used this most extraordinary opportunity, he wished to advance to every novelty [chs. 19–21].

The Pseudo-Quintilian Declamation 8 is, of course, a work of fiction. In spite of its bombastic tone, given its nature as a practice piece for the law courts, we are probably justified in taking its arguments against medical experimentation as those that were used by many Empiricist and Methodist physicians and nearly all laymen against the practice.¹⁷ Through the writings of encyclopedists, such as Celsus, it became possible for laymen to acquire a reasonably extensive knowledge of medicine. If the writer of Declamation 8 accurately reproduces for his own purposes the doctrines of the major medical sects, it is fair to assume that he also reflects their attitudes towards vivisection.

Galen on human dissection

Galen (c. 129 – c. 216 CE) was the most outstanding medical researcher of the ancient

¹⁷ For a summary see: [22].

world and a brilliant student of anatomy who had studied at Alexandria. He relates that human dissection was not practiced anywhere in the Roman Empire in the second century outside Alexandria; in fact, it is unlikely that it had been carried out even there since the time of Herophilus.¹⁸ Galen advises physicians, “Let it be your serious concern not only to learn accurately from books the shape of each bone, but also to carry out a keen visual examination of the human bones.... This is very easy at Alexandria...[and] for this reason, if for no other, try a visit to the city.”¹⁹ Galen writes that he could only observe human skeletons when they were preserved by chance. On one occasion he found a corpse that had been left by a bandit. The flesh had been eaten by birds, but Galen managed to rescue the skeleton to use for his own research. Ordinarily, however, he was forced to use animals, which he both dissected and vivisected. He most often used apes, pigs, and dogs; but he also dissected horses, asses, mules, cows, camels, sheep, lions, wolves, lynxes, stags, bears, weasels, mice, snakes, fish, birds, and several elephants. His favorite animal was the barbary ape, which is still to be found on the island of Gibraltar. His description of the animal remains the most detailed and accurate description of its anatomy published until modern times. Galen mentions the disagreeable aspect of seeing the animals suffer while being vivisected, and he recommends using a pig or a goat in cases where the brain has to be exposed in order to avoid seeing the unpleasant expression on the face of an ape when it is vivisected.

By the second century CE many doctors, especially those who belonged to the dominant Methodist and Empiricist sects, had little interest in anatomy. The continued fascination with vivisection that is apparent in certain Roman writers from Celsus to Augustine reflects a general aversion to any form of scientific examination of the human body that ultimately made even the dissection of cadavers impossible.

¹⁸ “The dissection of animals experienced a remarkable revival in the first and second centuries A.D.—a revival richly documented by Galen in his *On Anatomical Procedures*—but systematic human dissection was, it seems, never resumed in antiquity” [9, p. 241].

¹⁹ Galen. *Galen Opera* II. 220 / Kuhn (ed.). Leipzig, 1821. See: [7, pp. 250–251].

Modern vivisection: Japan and Germany

The moral repugnance that vivisection elicited in the classical period continues today in the debates of scholars and medical experts over the ethics of using data obtained from Japanese and German medical experimentation on humans, which included vivisection, during the 1930s and 1940s. Nazi experimentation on prisoners in concentration camps during the Great Patriotic War is fairly well known, but less well known are the details of that experimentation and the similar research undertaken by some Japanese physicians on prisoners prior to and during the War.

The Japanese military, led by Dr. General Shirō Ishii, conducted research and experimentation for the Biological Warfare (BW) program at various research units, many of them in Manchuria, following the Japanese invasion of 1931.²⁰ The majority of its subjects were prisoners from Chinese resistance forces, although other prisoners included Russians, Koreans, and Americans. They were referred to as *maruta* (“logs” or “lumber”).²¹ Some were injected with or exposed to deadly germs, including plague and anthrax, and subsequently vivisected or dissected for the study of disease progression. Others were exposed to extreme cold for the purpose of studying frostbite. Some were targeted by practice bombs and biological weapons in development. Still, others were vivisected for training in surgery and anatomy.

The experiments conducted on these prisoners were, in the words of a former army surgeon involved in the BW program, “necessary...in order to save the lives of Japanese soldiers” [26].²² But two studies of the practice question whether, even with ethics aside, the research had any practical value. According to researchers Charles Roland and Till Bärnighausen, it was of little or no value,²³ and did not contribute in a significant way to the “body of medical knowledge at the time” [28, p. 195]. The inadequate records kept by the

²⁰ For detailed information on the major research unit, Unit 731, see: [23]. Cf.: [24].

²¹ See: [25]. The essays in this book provide insight into various aspects of the Japanese BW programme as well as post-war politics, tribunals, and trials.

²² For another perspective on the values and factors influencing physicians’ participation in the BW program, see: [27].

²³ See: [28]. Cf.: [29, p. 159].

Japanese military testify to the experiments' lack of significance and scientific validity [29, p. 151].

Although documentation of the Japanese BW war crimes was available, during the International Military Tribunal for the Far East following the War, the United States preempted the Soviet attempt to point out and provide documentation of these crimes, offering Japanese BW leaders immunity in exchange for scientific data obtained from their experiments [25, p. 2]. It was not until the 1980s that scholarly and popular literature began to expose these medical experiments involving vivisection [25, p. 7].²⁴

The German counterpart to the Japanese BW program was the Nazi experimentation in concentration camps during the War. According to Roland, the war crimes' "Doctors Trial" convicted a number of "alleged vivisectors" [30, p. 426]. Research conducted by the Nazis involved, among much else, the study of diseases including malaria, the effects of freezing on the human body (living or dead), sterilization, and tissue regeneration. Twin studies were of particular interest to Dr. Joseph Mengele, who conducted experiments on hundreds of twin pairs at Auschwitz. Auschwitz survivor Eva Mozes-Kor remembers a pair of twins who died shortly after having their blood vessels and organs sewn together in an attempt to create Siamese twins [31, p. 57]. According to psychologist Nancy Segal, the motivation behind Dr. Mengele's twin studies is unclear [32, p. 286]; Roland asserts that the Nazi medical experiments in general were "scientifically crude, and all were barbarous [30, p. 426]."²⁵

In spite of their scientific shortcomings, the vivisection and other experiments conducted on prisoners in Japanese and German facilities had the potential, like Herophilus's research, to contribute to the fields of medicine and anatomy. Whether data obtained from these experiments should be used is a subject of debate among scholars who study their survivors. Even though human experimentation of the sort undertaken

during the War by Japanese and German researchers is no longer practiced, the debate is likely to continue, echoing the earlier debates of the Dogmatists and Empiricists regarding the ethics of vivisection that followed Herophilus's death when it was no longer practiced.²⁶

Saviour Siblings

This examination of vivisection concludes by considering a modern-day assisted reproductive technology with some parallels to the theme of Pseudo-Quintilian Declamation 8, known as pre-implantation tissue typing (PTT): the conception of a child known as a saviour sibling. In this procedure the fetus is conceived through in-vitro fertilization (IVF) in order subsequently to donate cells or organs to an older sibling suffering a fatal disease such as cancer or Fanconi anemia. Artificially fertilized zygotes undergo pre-implantation genetic diagnosis (PGD). Those that are genetically compatible with the diseased child, but free of his or her genetic defects, may be implanted in the mother's womb. At birth, blood from the saviour sibling's umbilical cord may be harvested for stem-cell transplantation, or an organ may later be harvested for transplantation from the saviour sibling to the older diseased sibling [34].

Ethical controversy surrounds this process. The IVF procedure itself is under question, and the saviour sibling, who is not only conceived for a utilitarian end, but may also be under pressure to donate cells or organs regardless of the medical consequences to his or her own health, is vulnerable to exploitation and objectification [35, p. 299].²⁷ This controversy was addressed and sensationalized in Jodi Picoult's novel *My Sister's Keeper*²⁸ and in the 2009 film by the same title.²⁹

²⁴ *The Sea and Poison*, the 1972 English translation of Endō Shūsaku's 1957 novel *Umi to dokuyaku*, is an example of popular fiction exposing the Japanese BW war crimes. For a review of *The Sea and Poison* see: Shūsaku E., Gard G. *The Sea and Poison // The Literature of War*. Ed. Thomas Riggs. Farmington: Gale, 2012.

²⁵ For a detailed analysis of the scientific crudity of Nazi hypothermia experiments, see: [33].

²⁶ Human experimentation on non-consenting subjects, apart from vivisection, continued to be practiced and debated following the Great Patriotic War. See.: [14, p. 139–141].

²⁷ Concern has been raised that if savior-sibling procedures continue to be permitted, they might in the future allow the conception of "designer babies", human embryos that have been genetically modified by means of gene therapy or PGD to create a child with certain traits, such as eye colour, which have been selected by its parents.

²⁸ Washington Square Press, 2005 (reprint edition).

²⁹ Cassevetes N. (director). Warner Home Video, 2009.

Although the conception of saviour siblings is legal in a number of countries, and although a 2004 survey indicated that 61% of Americans condoned the procedure,³⁰ several European countries including Italy and Germany still prohibited the practice as of 2011 [35, p. 294]. British law restricts the saviour-sibling technique to situations in which the diseased child suffers a “serious illness” and the saviour sibling donates only stem cells from umbilical-cord blood, bone marrow, or other tissue, as opposed to entire organs [35, p. 396–297]. French law as of 2004 requires that the chief end of a saviour sibling’s conception be simply the birth of a healthy child; to obviate the potential treatment of the saviour sibling as a means, the saviour sibling’s ability to aid in the diseased sibling’s medical treatment is to be of secondary importance [35, pp. 297–298]. Although such a law is impracticable to enforce, it emphasizes societal concern for saviour siblings’ psychological well-being and autonomy.

Ethical arguments in support of the conception of saviour siblings include the fact that children have been historically conceived, and human beings used, as means in all sorts of ways, such as producing an heir or completing a family [36]. It is also argued that, since the collective interests of the family significantly influence the well-being of a child, a saviour sibling’s participation in the healing of an older sibling can benefit the savior sibling psychologically by benefitting the family [34].

Even so, an analogy emerges between saviour siblings and the vivisection described in Pseudo-Quintilian Declamation 8. Like this fictional vivisection, the conception of a saviour sibling has the potential to exploit one person for the sake of another’s health. Although the transplantation of stem cells or organs from a saviour sibling is not at all like the procedure described in Declamation 8, both cases involve the removal of biological material from a living patient. Where they differ are in the cruelty of vivisection and the death of the vivisected twin. Yet the modern practice has the potential for physical harm to the savior sibling. It is not surprising that both practices have encountered significant opposition within

the medical profession and have engendered public controversy.

Roman patients, like Greek patients, believed that no physician had the right to experiment on a patient under his care. Hence in Declamation 8 the mother’s advocate charges that the physician who vivisected her son ostensibly to help find a cure for his brother had no reason to believe that he could find a cure for the other twin. He simply sought the opportunity to investigate the “hidden organs”.

By Hercules, the woman would have just grounds for complaints if by a new and unknown method you had saved even both. To have attempted unbelievable things, even those that would be beneficial, never comes from a strong affection; and in a matter which is more uncertain, the rashness of an experiment shows only the boldness of despair.³¹

A somewhat analogous situation occurs in the case of PTT, in which the child who is conceived for the sake of his or her sibling becomes a commodity who provides the means of saving a sibling’s life [36, p. 34]. The broader question is whether the younger child will suffer physically, psychologically, or socially, thereby violating the principle of non-maleficence [34, p. 1]? We regard vivisection with repugnance, whether undertaken for scientific purposes or ostensibly to provide a means of physical treatment for someone suffering an otherwise fatal disease. The idea of saviour siblings carries with it no inherent repugnance but rather the implied promise of human benevolence. But it is accompanied by a degree of risk and with that risk the question whether the benefits of the transaction are adequate to justify the procedure. It is an ethical question whether a child ought to be brought into the world conditionally: for experimental purposes, for the sake of another, or as means to an end (namely, saving the life of a sibling). That is the moral issue that underlies Pseudo-Quintilian Declamation 8 and it remains an issue for PTT.

In ancient times, no less than today, the idea of experimenting on the human body, a practice widely believed to make humans vulnerable to objectification, has been met with widespread disapproval. Nonetheless, it has been claimed

³⁰ “Genetic testing of embryos to pick ‘savior sibling’ OK with most Americans”. *Medical News Today*. 4 May 2004.

³¹ Pseudo-Quintilian Declamation 8, chapter 11. Quoted in [22, p. 288].

by its defenders that vivisection, as practiced by Herophilus and by twentieth-century Japanese and German researchers, contributed to medical research. Similarly, PTT, though not as controversial as vivisection, allegedly has the potential to aid in the treatment of children who are terminally ill and perhaps to save their lives. Hence the conflicting outcomes of human experimentation exemplified by vivisection, whether ancient or modern, provoked ethical debate in classical antiquity and will continue

to do so in any society that defines the ethical constraints within which medical science ought to operate.³²

³² Some of the material in this article originally appeared in two earlier articles of mine on vivisection and medical experimentation in antiquity. See: [2; 6]. I gratefully acknowledge the assistance of Lihani du Plessis, Celia Funk, and Joy McMurchy. Joy McMurchy first pointed out to me the similarities between Pseudo-Quintilian Declamation 8 and the controversy regarding saviour siblings.

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About the author

Gary Ferngren – Doctor of Philosophy, Professor at the School of History, Philosophy, and Religion at Oregon State University (USA) and the Department of the History of Medicine, National History and Culturology at FSAEI HE I.M. Sechenov First MSMU MOH Russia (Sechenov University).