



ANALGESIA – ANAESTHESIA

From Greek Antiquity to the Twentieth Century

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The Study of the History of Medicine

*“Life is short, the Art long, opportunity fleeting,
experiment treacherous, judgment difficult”*

Hippocrates, Aphorisms¹

The first of the *Aphorisms*, one of the most renowned of the Hippocratic works, foretells the longevity of the ‘*art of medicine*’ from the times of empirical knowledge and philosophical speculation, to the era of becoming an ‘*art*’ and finally a ‘*science*’. To understand this transition of medicine and the evolution of medical thinking through the ages one needs to delve in to history and specially the history of medicine. This is the linkage to our heritage that helps us understand human struggle and aspirations, societal evolution, and human nature.²

The study of the history of medicine, as Spyros Marketos, Professor of the history of medicine, wrote:

“... has two powerful scientific headlights. One is directed towards the past. The other illuminates the future.”³

The history of medicine sheds light on how modern medicine replaced all theocratic dogmas and philosophical speculations with rational scientific thought. It uses primary material to increase understanding of past events and, at the same time, to explore how past events have affected society today. It is salutary for those who entered medicine at a later date to learn the now forgotten difficulties and

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problems encountered in the course of history that beset the pioneers. It helps us to understand from where we came, it enriches our minds, our daily practice and often opens the way to new pursuits and the progress of the present.⁴As Nicholas Green wrote, the history of medicine helps us to

*“avoid repeating the follies, foibles, and fads of the past.”*⁵

The same transition and transformation is apparent in the historical development of anaesthesia from empiricism and experimentation to an impressive progress, which no other specialty experienced in the same way. The details of the long journey from the beginnings of recorded history, from the first desperate attempts of man to relieve the pain of trauma or disease, back to the roots of contemporary anaesthesia –one and half centuries ago– and to the last decades, are fascinating. Many of these exploits have become pertinent and made known by the *International Symposia on the History of Anaesthesia* (ISHA), organised since 1982 every four years and nowadays an established tradition.⁶ It was therefore singularly appropriate to bring together in the *Proceedings* of these Symposia, gathered information from the History of Anaesthesia which covers an impressive wealth of facts and practices.⁷⁻¹²

The name of the 7th *International Symposium on the History of Anaesthesia* was ‘*Analgesia – Anaesthesia: From Greek Antiquity to the 20th Century*’ (Figure 1) to emphasise the ‘analgesia and anaesthesia journey’ through the ages, particularly

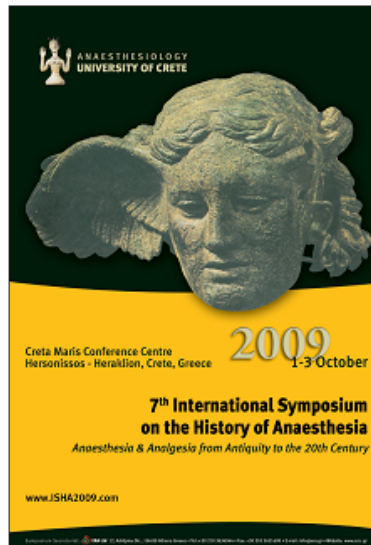


Figure 1. The poster of the 7th *International Symposium on the History of Anaesthesia*, held in 2009, in Heraklion, Greece.

as the venue for the 7th ISHA was Crete, a Greek island of such ancient history, that compels us to look back in time. This Mediterranean corner, in the crossroads of many civilisations, has facilitated the transmission, communication and cultural sharing of ideas that have travelled to influence humanity over the years. A transmission of ideas that influenced *European development*, as well as the emergence of *medicine* as a scientific phenomenon and of the concept of '*anaesthesia*' as a philosophical idea, described by *Plato*, and as a clinical phenomenon conveyed by *Hippocrates*.

Greek Antiquity: Rational Explanations

The Mythical Origin of Europe

The origins of *Europe* can be traced back to the island of Crete, a corner of the Mediterranean basin where, historically and geographically, *East* meets the *West*. According to Greek mythology, *Europa*, the legendary Phoenician princess, after whom the whole continent is named, arrived in the shores of Crete on the back of the god *Zeus* disguised as a beautiful white bull. In Crete, *Europa* gave birth by *Zeus* to three sons. One of them, *Minos*, was the founder of the first civilisation in Europe, the Minoan civilisation. In the following years myth, religion and territorial identity went together in harmony. Even *Hippocrates* differentiates culturally and politically Europeans (not necessarily Greeks) from Asians. In his treatise *On Airs, Waters, and Places* he mentions:

*"I wish to show, respecting Asia and Europe, how, in all respects, they differ from one another, ... I say, then, that Asia differs very much from Europe as to the nature of all things, ..."*¹³

Medicine as a Secular Science

This Mediterranean basin also witnessed the emergence of Medicine as a secular science in the fifth century BCE, in the face of the Greek physician *Hippocrates*. Little is known about him, but a strong tradition surrounds his name and the Hippocratic School at the Aegean island of Kos. *Hippocrates* was the first to reject the theories that implied that only god is responsible for illness. He separated philosophy from medicine and expelled the gods in one incisive stroke. Thus he freed medicine from magic, superstition and at last religion. Diseases were given a logical interpretation and were no longer considered a punishment resulting from divine wrath. His works, *Sacred Disease*, *Art* and *Ancient Medicine*, attack respectively the 'divine' origin of diseases and the intrusion into medicine of the hypothetical speculation of philosophers.¹⁴ The Hippocratic writer of *Sacred Disease* (sacred means epilepsy) asserts:

“It is not [the disease called sacred], in my opinion, any more divine or more sacred ..., but has a natural cause, and its supposed divine origin is due to men’s inexperience”.¹⁵

And in the *Art Hippocrates* argues that:

*“... if really it be possible to see the non-existent, as it is to see the existent, I do not know how a man could regard as non-existent what he can both see with his eyes and with his mind think that it exists”*¹⁶

Hippocrates, besides the actual practice of medicine, also tried to promote the progress of medicine. His forethoughts about medicine are impressive, when in *Ancient Medicine* he writes that medicine as always existed.

“But medicine has long had all its means to hand, and has discovered both a principle and a method, through which the discoveries made during a long period are many and excellent, ... But anyone who, casting aside and rejecting all these means, attempts to conduct research in any other way or after another fashion, and asserts that he has found out anything, is and has been the victim of deception.”^{17a}

The merits of Hippocratic medicine and its messages were emphasised in the opening Hippocrates Lecture ‘Loosing the Hippocratic tradition: a danger to our profession?’ by Dr David John Wilkinson.¹⁸

Anaesthesia as a Philosophical and Clinical Concept

It is in the *Hippocratic Corpus*, that the word ‘*anaesthesia*’ was used for the first time in a medical context as loss of sensation and unconsciousness.¹⁹ In the treatise *Breaths* the adjective ‘*anaesthetos(a)*’ acquires the medical meaning of loss of sensation, when *Hippocrates* writes:

“For when they [breaths] pass through the flesh and puff it up, the parts of body affected lose the power of feeling [‘anaesthesia’]”.^{20a}

Again, ancient Greeks were the first to seek rational explanations for the phenomena they observed. *Plato*, one of the most creative thinkers of the ancient world, the founder of the famous Academy, used the word in a philosophical context.¹⁹ In his work *Philebus* the word has the philosophical meaning of

“... the oblivion of the soul from the movements of the body” or “want of perception”.²¹

In the Hippocratic treatise *Breaths* ‘*anaesthesia*’ is related to ‘*analgesia*’, when the writer affirms that the patient who is unconscious, is also insensitive to pain, ‘*analgetos(i)*’:



Figure 2. Roman bronze head of the god of sleep ‘Hypnos’, found in Perugia, Italy. British Museum, London.

“At this time the patients are unconscious [‘anaesthetoī’] of everything, deaf to what is spoken, blind to what is happening and insensible to pain [‘analgetoī’].”^{20b}

Once again, both Greek words express loss of feeling and insensitivity to pain caused by a disease process rather than as a result of a pharmacological action.¹⁹

Although *Hippocrates* does not refer to pharmacological anaesthesia and its different aspects, he knew that some herbal substances could induce sleep. Hippocratic physicians used the word ‘*hypnikon*’, bringing sleep, to describe soporific substances applied to patients with toothache.¹⁹ The word is derived from the word ‘*hypnos*’, sleep, still used in modern Greek, from which the terms ‘*hypnosis*’ and ‘*hypnotikon*’, hypnotic, are derived.^{19,22} In Greek mythology, *Hypnos* was a singularly ancient deity closely associated with other deities, like oblivion, *Lethe*, pain, *Ponos*, and most of all with death, *Thanatos*, his twin brother. Hippocratic physicians separated the mythical god *Hypnos* from the natural phenomenon, when they observed in the work *Dreams* that:

*“For the body when asleep has no perception [aesthanetai], but the soul when awake has cognizance of all things – sees what is visible, hears what is audible, walks, touches, feels pain, ponders.”*²³

It was in the twentieth century that John W Severinghouse made the connection of anaesthesia with the mythical god *Hypnos*, when he wrote in his introduction to John Nunn’s *Applied Respiratory Physiology*, referring to the Roman bronze head of *Hypnos* (*Figure 2*) with a burning candle in front of it:

*“And what of the god of sleep, patron of anaesthesia? Now before Hypnos, the artisan has set the respiring flame that he may, by knowing the process, better the art.”*²⁴

No wonder that the god *Hypnos* was chosen as the emblem of the 7th ISHA, a meeting held in Greece.

Nineteenth Century – A Major Breakthrough

During the middle ages the treatment of pain was featured with pessimism and fatalism. Doctors were still influenced by *Galen's* medicine, and applied peculiar therapies based on bleeding, laxatives and vomiting. Rational scientific thinking during Romanticism brings a critical change. Pain and disease were no longer considered a result of supernatural phenomena but rather an expression of nature. Their study and cure could be modified accordingly. By the early 1840s successive cultural and medical changes based on newer humanistic standards had resulted in the view that physical pain is purposeless.²⁵ This new concept regarding pain prevention and its relief is the social scenery for the discovery of modern 'anaesthesia' during the middle of the 19th century.

Pain had not prevented surgery in the past, but it had made it almost an unbearable, excruciating agony. This is how, in January 1843, George Wilson, a medical student who underwent surgery to amputate an infected leg, described his experience of surgery without anaesthesia and analgesia:

*"Of the agony it occasioned, I will say nothing. Suffering so great as I underwent cannot be expressed in words. ... The particular pangs are now forgotten; but the black whirlwind of emotion, the horror of great darkness, and the sense of desertion by God and man, bordering close upon despair, which swept through my mind and overwhelmed my heart, I can never forget ..."*²⁶

Although, in the decade 1835-1845 there were attempts to suspend consciousness by anaesthetic agents, these gained little recognition, as breathing of gas carried the danger of asphyxia and, ultimately, death. The world-famous October 16th, 1846 successful ether demonstration by Thomas Green Morton received much attention, partly due to serendipity, as the ether worked and did not cause asphyxia.²⁵ To lend credit to the Hippocratic axiom:

"And that physician who makes only small mistakes would win my hearty praise. Perfectly exact truth is but rarely seen."^{17b}

By the end of the 19th century, anaesthesia, as a method to alleviate pain during operations, had become a landmark in the history of medicine and a symbol for the wider humanitarian movement.²⁵ It was proclaimed as one of the civilising factors of the Western world and remains the most vivid example of medicine's capacity to diminish human suffering. The new discovery was given the name 'anaesthesia' by Oliver Wendell Holmes (1809-1894), the renowned Harvard profes-

sor of anatomy and physiology, who had attended this first historical demonstration. In a letter to Morton, Holmes wrote:

*“The state should, I think, be called ‘anaesthesia’. This signifies insensibility, more particularly (as used by Linnaeus and Cullen) to objects of touch.”*²⁷

So, about 2300 years after the introduction of the word ‘anaesthesia’ in a medical context by *Hippocrates*, Oliver Wendell Holmes proposed the term for a mostly momentous discovery, for a newly born medical practice. One more medical term of Greek origin enriched the international medical vocabulary.

However, William Thomas Green Morton (1819-1868) was not the first in history to use ether as an anesthetic. In March 30th, 1842, Crawford Williamson Long (1815-1878) a doctor from Georgia, applied his social observations from ‘ether frolics’ to remove under ether a cyst from the neck of a young man, who did not feel any pain. Long did not publish his findings as he wanted to be sure of his discovery, until an editorial appeared in the December 1846 issue of *Medical Examiner* about Morton’s ether demonstration. Therefore, although Long was the first, Morton was given credit for using ether for surgical anaesthesia. Another such example is the case of Joseph Priestley (1733-1804) and Carl William Scheele (1742-1786) for the discovery of oxygen. John W Severinghouse, in a lecture on *Hidden ‘Fire Air’, Hidden Letter: Oxygen’s Historic Dilemmas* during the 7th ISHA, unravelled the truth why the credit of such a significant discovery did not go to Scheele.²⁸

The next significant innovations were the use of chloroform in obstetrics by James Young Simpson in 1847, and of local anaesthesia by cocaine by Carl Koller in 1884, unknown details about the life of whom are portrayed in this volume. Less recognised aspects of the work of pioneers of anaesthesia, and related fields, are also presented, as for instance of James Moffat, Friedrich Von Esmarch, Benjamin Ward Richardson, Thomas Henry Huxley, Joseph Clover, Frederic William Hewitt, Samuel J Hayes, Carl Koller, Rupert Walter Hornabrook, Renè Leriche, Henry Chambert, Jaroslav Heyvroský, Mark Cowley Lidwill, as well as of other pioneers. The history of technical innovations such as the early respirators in the second half of the 19th century was unfolded by Wulf Strätling and colleagues, in a presentation that got the award of the best 7th ISHA paper.²⁹

Twentieth Century – Key Advances

The ether and chloroform era and the significant advances in everyday anaesthesia that highlighted the 19th century extended until the end of World War One. Afterwards, the significant boost in medicine led to the development of the specialty of Anaesthesiology at both sides of the Atlantic and Australia and the transition of anaesthesia from a craft into a specialty discipline. However, for the

progress of general anaesthesia into the 20th century, according to Sir Keith Sykes, the decisive steps were:

*“...to develop an apparatus that could add ether or chloroform to a mixture of oxygen and nitrous oxide, ... to devise a way in which an airtight connection could be made with the lungs, ... to learn how to maintain ventilation of the lungs, to devise a method of preventing collapse of the lungs...”*³⁰

The introduction of intravenous agents, in the 1930s, of muscle relaxants in the 1940s and of halothane in the mid-1950s brought about a revolution in the practice of anaesthesia. At the same time, significant, and less significant, advances in new techniques, drugs, equipment and the expansion of Anaesthesiology far beyond the operating theatres all contributed to this evolution. Such examples presented in this volume are the first successful human intracardiac pacing, the introduction of hypothermia for cardiac surgery by air-cooling, the use of resuscitation devices, the first successful management of malignant hyperthermia and also the development of pain clinics and veterinary anaesthesia.

Anaesthesia continued to develop in the 20th century and its safety and efficacy was considerably improved. The scientific foundations of anaesthesia and the pioneering work of many anaesthetists reconfigured surgical practice. Anaesthesia, by releasing surgery from the barriers of pain and trauma, and allowing an impressive variety of lifesaving procedures to be developed, proved to be overwhelmingly greater than initially anticipated, a great gift to humankind.

Conclusions

*“The farther backward you can look, the farther foreword you can see”*³¹

This famous quote of Sir Winston Churchill stresses the fact that the knowledge of the past helps to organise in a better way the future for the next generations. No doubt, *‘anaesthesia’* of today is the culmination of many earlier discoveries and events which have opened the way to present day progress. The goal of the *International Symposia on the History of Anaesthesia* is to present and relate past initiatives with evidence and to encourage research about how earlier scientists thought and worked. This diachronic dimension of history, which facilitated Anaesthesiology to reach its current scientific significance was also expressed by the 7th ISHA. This volume is a demonstration of the evolutionary journey of *anaesthesia* and *analgesia* from antiquity to the twentieth century.

References

1. Hippocrates. *Aphorisms*. Vol IV. Jones WHS, trans. Cambridge, Massachusetts: Harvard University Press, 2005: I.I.2.
2. Desai SP, Buterbaugh J, Desai MS. The Making of an Anesthesia Historian: Lessons from a Worldwide Biographical Survey. *Anesth Analg* 2011; 113: 383-6.
3. Μαρκέτος ΣΓ. *Ιστορία της Ιατρικής του 20ού αιώνα*. Αθήνα: Ζήτα Ιατρικές Εκδόσεις, 2000.ⁱⁱ
4. Ασκητοπούλου Ε. Η Ιστορία της Αναισθησίας. Άρθρο Σύνταξης,ⁱⁱⁱ *Acta Hellen Anaesthesiol* 2010; 43(3-4): 91-94.
5. Greene N. Dr Gwenifer Wilson: First Laureate of the History of Anesthesia. *Anesthesiology* 1996; 85: 703-705.
6. Ruprecht J, Erdmann W. International Symposia on the History of Anaesthesia (1982-1992); With particular emphasis on the first one. In: *The History of Anesthesia. Proceedings, the Fourth International Symposium on the History of Anaesthesia*. Schulte am Esch J, Goerig M, eds. Lubeck, Verlag DragerDruck GmbH & Co, 1997: 21-34.
7. Ruprecht J, van Lieburg MJ, Lee JA, Erdmann W, eds. *Anaesthesia: Essays on Its History*. Heidelberg, Berlin, New York, Tokyo: Springer-Verlag, 1985.
8. Atkinson RS, Boulton TB, eds. *The History of Anaesthesia. Proceedings of the Second International Symposium on the History of Anaesthesia*. London, New York: Royal Society of Medicine Services Ltd, 1989.
9. Fink RA, Morris LE, Stephen CR, eds. *The History of Anaesthesia. Proceedings, Third International Symposium*. Park Ridge, Illinois: Wood Library-Museum of Anesthesiology, 1992.
10. Schulte am Esch J, Goerig M, eds. *The History of Anesthesia. Proceedings, the Fourth International Symposium on the History of Anaesthesia*. Lubeck, Germany: Verlag DragerDruck GmbH & Co, 1997.
11. Diz JC, Franco A, Bacon DR, Ruprecht J, Alvarez J, eds. *The History of Anesthesia. Proceedings of the Fifth International Symposium*, Santiago, Spain, 2002. Amsterdam, The Netherlands: Elsevier Health Sciences, 2002.
12. Drury PME, Armitage EN, Bacon DR, Barr AM, Bennetts FE, Horton JM, Kuipers AJ, Mckenzie AG, Morris P, Padfield A, Rucklidge MA, Wilkinson DJ, Zuck D, eds. *The History of Anaesthesia. Proceedings of the Sixth International Symposium on the History of Anaesthesia*, Cambridge, UK, 2005. Reading, Berkshire, UK: Conservatree, 2007.

ⁱⁱ Marketos S. *History of Medicine of the 20th Century*. Athens: Zeta Publ, 2000.

ⁱⁱⁱ Askitopoulou H. History of Anaesthesia. Editorial.

13. Hippocrates. *On Airs, Waters, and Places*. Vol I. Jones WHS, trans. Loeb Classical Library. Cambridge, Massachusetts: Harvard University Press, 2004: XII.
14. Jones WHS. *General Introduction*. In: Hippocrates. Vol. I. Ancient medicine. Airs, Waters, Places. Epidemics I & III. The Oath. Precepts. Nutriment. Loeb Classical Library. Cambridge: Harvard University Press, 1923.
15. Hippocrates. *The Sacred Disease*. Jones WHS, trans. Vol. II. Loeb Classical Library. Cambridge: Harvard University Press, 1923: I.2-10.
16. Hippocrates. *The Art*. Jones WHS, trans. Vol. II. Loeb Classical Library. Cambridge: Harvard University Press, 1923: II.5-8.
17. Hippocrates. *Ancient Medicine*. Vol I. Jones WHS, trans. Cambridge, Massachusetts: Harvard University Press, 2004: (a) II.1-9, (b) IX.21-22.
18. Wilkinson DJ. *Loosing the Hippocratic tradition: a danger to our profession?* In: History of Anaesthesia VII. Proceedings of the 7th International Symposium on the History of Anaesthesia. Askitopoulou H, McGoldrick KE, Westhorpe RN, Wilkinson DJ, eds. Herakleion: Crete University Press, 2012: 15-22
19. Astyrakaki E, Papaioannou A, Askitopoulou H. References to Anesthesia, Analgesia, and Pain in the Hippocratic Collection. *Anesth Analg* 2010; 110:188-94.
20. Hippocrates. *Breaths*. Vol II. Jones WHS, trans. Cambridge, Massachusetts: Harvard University Press, 1998: (a) XIII.2-4, (b) XIV.44-46.
21. Plato. Philebus. Vol VIII. Goold GP, ed. Fowler HN, trans. Cambridge, Massachusetts: Harvard University Press, 1975: Stephanus 34.a.
22. Askitopoulou H, Ramoutsaki IA, Konsolaki E. Analgesia and anesthesia: etymology and literary history of related Greek words. *Anesth Analg* 2000; 91:486-91.
23. Hippocrates. *Regimen IV or Dreams*. Vol IV. Jones WHS, trans. Cambridge, Massachusetts: Harvard University Press, 2005: LXXXVI.12-16.
24. Severinghouse JW. *Introduction*. In: Applied Respiratory Physiology. J Nunn, ed. Oxford: Butterworth-Heinemann, 1969.
25. Snow SJ. Medical milestones: Anaesthesia, symbol of humanitarianism. *BMJ* 2007; 334: Suppl 1: s5.
26. Adler RE. *Such Stuff as Dreams are made on: The Discovery of Anesthesia*. In: Medical Firsts. From Hippocrates to the Human Genome. Adler RE, ed. Hoboken, New Jersey: John Wiley & Sons, Inc, 2004: 83-94.
27. The American Heritage Dictionary of the English Language, 3rd edition. Boston: Houghton Mifflin Company, 1992.
28. Severinghouse JW. *Hidden 'Fire Air', Hidden Letter: Oxygen's Historic Dilemmas*. In: History of Anaesthesia VII. Proceedings of the 7th International Symposium on the History of Anaesthesia. Askitopoulou H, McGoldrick KE, Westhorpe RN, Wilkinson DJ, eds. Herakleion: Crete University Press, 2012: 97-111.

29. Strätling MWM, Niggebrügge C, Schumacher J. *The history of early respirators (mid-1800s-1918): A Systematic Re-Assessment of the Main 'Technology-Transfer', which led to the Development of Modern Anaesthesia Technology*. In: History of Anaesthesia VII. Proceedings of the 7th International Symposium on the History of Anaesthesia. Askitopoulou H, McGoldrick KE, Westhorpe RN, Wilkinson DJ, eds. Herakleion: Crete University Press, 2012: 159-180.
30. Sykes K, Bunker JP. *Anaesthesia and the Practice of Medicine: Historical Perspectives*. London: Royal Society of Medicine Press Ltd, 2007: 33-46.
31. *Churchill by Himself*. Langworth RM, ed. UK: Ebury Press, 2008: 576.