



AHA

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## The Quest for Anesthetic Depth: Albert Faulconer, Electroencephalography and the Servo-Controlled Anesthesia Machine

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### Introduction

In October 1996 the Food and Drug Administration approved the use of a new monitoring device of anesthetic effect that integrates various electroencephalogram (EEG) descriptors into a single dimensionless, empirically calibrated number, the Bispectral Index (BIS, Aspect Medical Systems, Natick, MA).<sup>1</sup> The BIS monitor is the latest innovation in the quest for a reliable monitoring device of anesthetic depth, the "holy grail" of monitoring for anesthesiologists.<sup>2</sup> This new monitor is gaining acceptance in the anesthesia community, but the basic concept of this idea goes back to the early 1950's. At that time Albert Faulconer and Reginald Bickford from the Mayo Clinic first systematically investigated EEG changes induced by various anesthetic agents.<sup>3-5</sup> In a pioneering project, they went a step further and attempted to create the first closed-loop anesthesia delivering device, the servo-controlled anesthesia machine, aimed at automatic control of anesthetic depth via EEG guided delivery of anesthetic agents.<sup>6</sup> The following is an illustration of some of the problems associated with this groundbreaking idea.

### Electroencephalography and anesthesia: the early years

Richard Caton, a physician in Liverpool, first noted the occurrence of electric potentials in the brains of animals in 1875.<sup>7</sup> In 1890, von Marxow described the effects of chloroform anesthesia on brain waves.<sup>8</sup> In 1929, Hans Berger, a psychiatrist in Jena, Germany and the "fa-

ther of electroencephalography," demonstrated that the electric potentials of the human brain could be recorded from electrodes placed on the surface of the head.<sup>9</sup> Four years later he described the loss of alpha-waves in the EEG caused by chloroform anesthesia.<sup>10</sup> In 1937, Gibbs and associates noted that the EEG was sensitive to anesthetic agents and postulated:

A practical application of these observations might be the use of the electroencephalogram as a measure of the depth of anesthesia during surgical operations. The anesthetist and surgeon could have before them on tape or screen a continuous record of the electrical activity of both heart and brain.<sup>11</sup>

Shortly thereafter, EEG changes were reported with the use of cyclopropane<sup>12</sup> and barbiturates.<sup>13</sup> In the early 1950's, Faulconer and his colleagues studied the EEG changes produced by ether,<sup>3</sup> sodium thiopental,<sup>4</sup> and cyclopropane<sup>5</sup> under actual surgical conditions. They classified the results of administration of an anes-

thetic agent into distinct patterns identifiable on the EEG, based upon the observation that "the electric output of the brain would decrease progressively from the stage of light anesthesia to that of deep anesthesia."<sup>14</sup> After identifying 7 distinct EEG levels (Fig. 1) with ether administration,<sup>3</sup> 6 with cyclopropane anesthesia,<sup>5</sup>

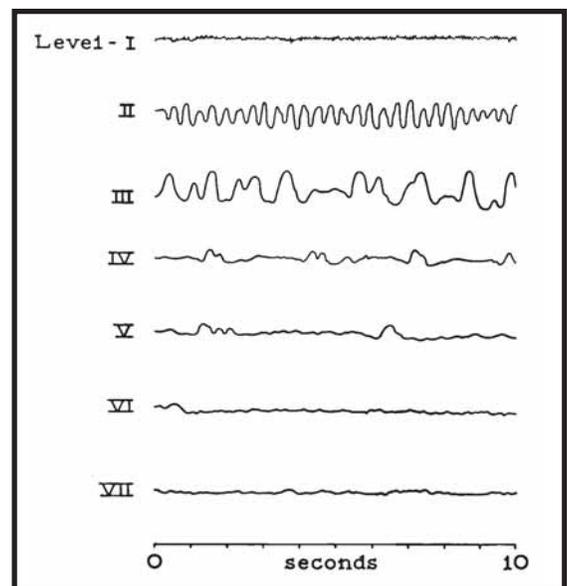


Fig 1: Characteristic patterns of successive electroencephalographic levels of ether anesthesia as described by Courtin, Bickford and Faulconer in 1950.<sup>3</sup> Levels IV to VI represent progressively increasing suppression to burst intervals. Level VII is isoelectric. (From Faulconer A, Bickford RG: *Electroencephalography in Anesthesiology*. Springfield, Charles C Thomas, 1960. Courtesy of Charles C Thomas, Publisher, Springfield, Illinois).

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## ASA Annual Meeting: Forum on the History of Anesthesiology

Monday, October 14, 2002, 2 – 5 PM  
Orange County Convention Center- Room 414 A

### Spreading the Word: The Use of History in Day-to-Day Anesthesia

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Moderator: Douglas R. Bacon, M.D., M.A.  
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1. Celebrating Great Moments in Anesthesia History—  
Harvard and the 150<sup>th</sup> Celebration of Ether Day

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2. Honoring National Figures—the Apgar Postage Stamp Story

Selma H. Calmes, M.D.  
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Department of Anesthesiology  
Olive View-UCLA Medical Center  
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3. Celebrating Your Department's Anniversary

H. Michael Marsh, M.D.  
Professor and Chair  
Department of Anesthesiology  
Wayne State University  
Detroit, Michigan

4. Presenting Papers—Meetings with a Historical Bent

Doris K. Cope, M.D.  
Professor and Director, Pain Medicine  
University of Pittsburgh  
Pittsburgh, Pennsylvania

5. Getting Published—What an Editor Looks for in a History Article

David Cullen, M.D.  
Professor and Head  
Department of Anesthesia  
University of Iowa  
Iowa City, Iowa

6. History for Academic Promotion

Mark Warner, M.D.  
Professor and Chair  
Department of Anesthesiology  
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7. Teaching Residents

Douglas R. Bacon, M.D., M.A.

8. Anesthesia History Overseas—the British Experience

David J. Wilkinson, M.B., F.R.C.A.  
St. Bartholomew's Hospital  
London, United Kingdom

## ASA Annual Meeting: Panel on History

Tuesday, October 15, 2002, 2 to 4 PM  
Orange County Convention Center – Room 224 H

### *Coming Full Circle:* The Recrudescence of Ideas in Anesthesiology

Objective: After attending this panel the learner will gain an appreciation for techniques in anesthesiology that have been used for a variety of purposes. The learner will gain an appreciation for the versatility and periodicity of ideas within the specialty. The learner will also gain an understanding of a small part of the history of anesthesiology that may engender new ideas to apply these tested techniques.

#### Moderators:

Douglas R. Bacon, M.D., M.A.  
Associate Professor of Anesthesiology  
Mayo Clinic  
Rochester, Minnesota

Maurice S. Albin, M.D., M.Sc.(Anes.)  
Professor of Anesthesiology Emeritus  
University of Texas Health Sciences Center  
San Antonio, Texas

1. Circulating CSF: The Birth, Death and Resurrection of Spinal Anesthesia  
Douglas R. Bacon, M.D., M.A.
2. Induced Hypothermia—is it cool again?  
Edwin H. Rho, M.D.  
Instructor in Anesthesiology  
Mayo Clinic  
Rochester, Minnesota
3. Off-On-Off: The heart in search of Perfect Perfusion  
Charles Hantler, M.D.  
Professor of Anesthesiology  
Washington University St. Louis  
St. Louis, Missouri
4. Induced Hypotension: How Low Should You Go?  
Maurice S. Albin, M.D., M.Sc.
5. Back to Nature: the changing role of anesthesia in Childbirth from 1846-2002!  
Donald Caton, M.D.  
Professor of Anesthesiology and Obstetrics  
University of Florida Gainesville  
Gainesville College of Medicine  
Gainesville, Florida
6. TIVA—the 1930s revisited?  
Peter S. Sebel, MB, BS., Ph. D, M.B.A.  
Professor and Vice Chair  
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## Faulconer. . . Continued from page 1

and 5 with pentothal anesthesia,<sup>4</sup> Faulconer was convinced that the EEG could be used "as a reliable index of the depth of anesthesia."<sup>15</sup> His finding that increased arterial ether concentrations correlated nicely with greater EEG depression linked the electrophysiologic effect of ether to a measure of anesthetic uptake and lent further credence to the use of EEG as a measurement of anesthetic depth.<sup>16</sup>

### The development of the servo-controlled anesthesia machine

Faulconer was searching for a more scientific basis to assess anesthetic depth, as he recognized that since John Snow's early clinical observations in 1858<sup>17</sup> "the diagnosis of depth of anesthesia in this manner has never been an exact science but is truly an art."<sup>6</sup> Convinced that "EEG changes occurring during surgical anesthesia might provide a basis for a more objective and exact estimate of the depth of anesthesia,"<sup>6</sup> he and Bickford developed the first automatic EEG controlled anesthesia delivering system. Bickford was the driving engineering force behind the project.<sup>18</sup>

Their servo-controlled anesthesia machine was based upon the principle that "the output of cortical electrical energy falls off consistently in relation to increas-

ing depth of surgical anesthesia"<sup>19</sup> and consisted of an EEG monitor recording cortical electrical activity obtained from a single fronto-occipital electrode pair placed on the scalp of the patient. The EEG voltages were summated with an integrating circuit and converted to pulses proportional in number to the time-integrated EEG potential. These integrator output pulses triggered a stepping relay leading to a syringe pump-driven administration of a unit dose of the anesthetic agent into the circulation or anesthesia circuit (Fig. 2). The frequency of dosing and thus anesthetic depth was independently adjustable by changing the gain of the EEG voltage output. Thus the servo-controlled anesthesia machine delivered a predetermined unit dose of anesthetic agent at a rapid rate when the summated EEG potential was high (fast or high amplitude EEG activity), and at a slower rate when the pattern revealed less activity. Bickford compared the principles of this design to "application of engineering principles to the human that have been known since James Watt invented the governor for his steam engine."<sup>6</sup>

Testing this closed-loop system in animals showed "that a desired level of surgical anesthesia could be maintained automatically for long periods of time (two to three days) without human interference."<sup>6</sup> In 1950, the first human trial with 50 patients undergoing major abdominal

surgery was presented before the section of surgery, general and abdominal, at the 99<sup>th</sup> annual session of the American Medical Association in San Francisco. The authors concluded that "as an outcome of this work it was seen that there were changes in the electroencephalographic pattern of sufficient clarity, magnitude and consistency to allow these changes to be related to depths of anesthesia progressing from loss of consciousness to complete respiratory paralysis."<sup>6</sup> The researchers also noted that "the EEG foretells a change in depth of anesthesia many seconds before the change is apparent to an anesthetist. Thus the system is more capable than an anesthetist of maintaining a constant level."<sup>6</sup> In a letter of discussion accompanying the publication, William Estes, a surgeon from Bethlehem, PA remarked:

My only qualification to discuss this report is that I have seen this remarkable machine in action. It is most uncanny and dramatic to observe the automatic record of the patient's condition unfold, including both the electrocardiographic changes and the electroencephalographic record, while the little click every few seconds indicates the automatic administration of small increments of the anesthetic agents. The mechanism by which all this is accomplished is most baffling to a

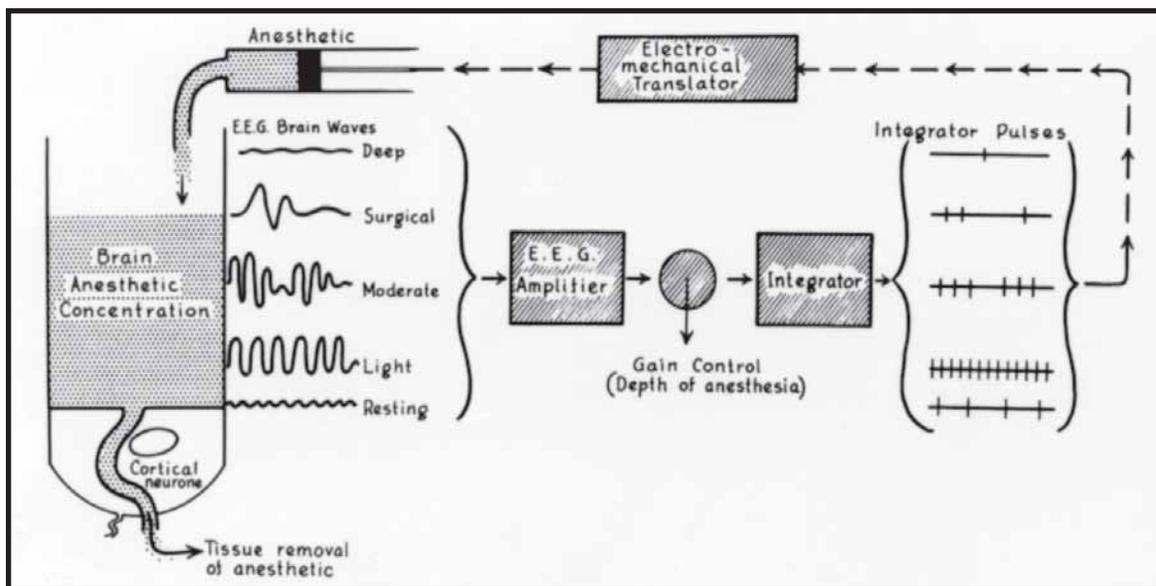


Fig. 2: The principle of the servo control mechanism after Faulconer and Bickford<sup>15</sup>. The patient EEG (left) is the physiologic variable measured and ultimately drives the electromechanical translator (top center) of the drug delivery system (top left). The raw EEG is integrated over specified time intervals and amplified to increase output (see integrator pulses on right) to the drug delivery system as a function of total EEG amplitude. (From Faulconer A, Bickford RG: *Electroencephalography in Anesthesiology*. Springfield, Charles C Thomas, 1960. Courtesy of Charles C Thomas, Publisher, Springfield, Illinois).

mere surgeon. Although the full significance of a machine of this character in the field of anesthesia is at this time difficult to predict, the immediate potentialities are most impressive and seem epoch making.<sup>6</sup>

With limited data-processing resources at that time, Faulconer and Bickford refined the servo-controlled anesthesia machine by trying to minimize outside electrical interference from sources other than the EEG signal.<sup>20</sup>

Faulconer also noted significant individual variability in observations early in his research.<sup>16</sup> But in contrast to "the transient and somewhat inconstant nature of the clinical signs, and the variations in their interpretation by different individuals,"<sup>16</sup> he found the EEG patterns of anesthesia to be more objective<sup>6</sup> and believed in the clinical and research applications of his "servo-anesthesia";<sup>19</sup> a notion that was not shared by all of his colleagues.<sup>21</sup> However, both Faulconer and Bickford were well aware, that "automatic control cannot be more reliable than the electroencephalographic information on which it operates."<sup>22</sup>

This statement reflects one of the fundamental problems associated with automatic anesthesia control: the need for a reliable neurophysiologic endpoint to provide an assessment of anesthetic depth to guide the unit dosing of a closed-loop anesthetic administration system. While the spectrum of effects constituting general anesthesia and anesthetic depth is still hotly debated,<sup>23,24</sup> blocking the somatic motor response to painful stimuli is widely used as an indicator of anesthetic adequacy. The end-tidal concentration of anesthetic agent required to achieve this unresponsiveness (MAC) remains the benchmark of anesthetic potency.<sup>25,26</sup>

More than a decade before the concept of MAC was introduced, and in an era where muscle relaxants were not yet routinely used, the servo-controlled anesthesia machine was designed to achieve immobility during surgical stimuli by increasing the concentration of the anesthetic agent until burst suppression in the EEG occurred.<sup>19</sup> Although this level of anesthesia would be considered unnecessarily deep by modern standards, it was an appropriate way to provide satisfactory surgical conditions at a time when sophisticated pharmacological tools and monitoring equipment were limited.

Why the servo-controlled anesthesia machine did not gain widespread popularity following its introduction into clinical

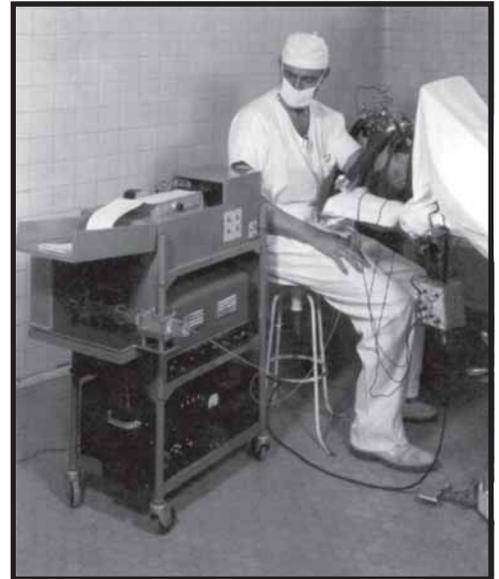
practice remains unclear, but the need for constant supervision and adjustment and the development of new pharmacologic agents, particularly muscle relaxants, may have played significant roles (Professor P. Southorn, Mayo Clinic, Rochester, MN; personal communication). Faulconer and Bickford, however, deserve recognition for opening a new chapter in the quest for monitoring anesthetic depth by first recognizing the potential usefulness of EEG monitoring to guide the delivery of anesthetic agents almost half a century before the BIS monitor.

New research over the last decade has painted an even more complicated picture about monitoring anesthetic depth than originally anticipated. Recent research attempts to relate sophisticated computer-processed EEG to clinical anesthetic depth have resulted in inconclusive findings.<sup>27,28</sup> Other autonomic or electrophysiologic measurement techniques, such as auditory evoked potentials<sup>29</sup> or contractility of the lower esophagus<sup>30</sup> do not consistently correlate with anesthetic depth either.<sup>31</sup> The BIS monitor, designed to measure the hypnotic component of an anesthetic regimen, has been shown to predict loss of consciousness and loss of recall with good probability under certain clinical conditions.<sup>32,33</sup>

Recent case reports showing intra-operative awareness despite adequate BIS values illustrate the complexity of the problem of measuring adequate anesthetic depth using cortical neurophysiologic monitoring.<sup>34,35</sup> Furthermore, animal studies over the last decade suggest that anesthesia-induced immobility to surgical stimulus may be a subcortical or spinal cord phenomenon.<sup>36,37</sup> With accumulating evidence that anesthetic actions at the spinal cord level determine MAC,<sup>36,38,39</sup> we can now appreciate why measuring cortical electrical activity from the surface of the human brain does not correlate reliably with anesthetic depth as we currently define it.

### Conclusions

Assessment of anesthetic depth even in the 21<sup>st</sup> century is still an art rather than a science. Albert Faulconer and Reginald Bickford from the Mayo Clinic established the first electrophysiologic attempt of measuring anesthetic depth based upon EEG monitoring. They also designed the first automatic anesthesia-delivering de-



*Fig. 3: Donald Sotero, a colleague of Albert Faulconer, with the servo-controlled anesthesia machine. This model automatically delivered pentothal anesthesia. The syringe pump is on the left side of the servo-anesthesia machine. This system was also adopted for administration of ether anesthesia, wherein ether was injected from the syringe pump into the inspiratory limb of the anesthesia circuit. (From Rehder K, Southorn P, Sessler A: Art to Science. Mayo Foundation for Medical Education and Research, Rochester, Minnesota, 2000. By permission of Mayo Foundation for Medical Education and Research).*

vice, the servo-controlled anesthesia machine (Fig. 3). More than 40 years later the same idea, EEG monitoring to assess anesthetic adequacy, has been reintroduced to the anesthesia community in the form of the BIS monitor. An increasing number of recent publications in the anesthesia literature indicate the great interest as well as the ongoing controversy, but the quest for adequate monitoring of anesthetic depth continues.

### References

1. Johansen JW, Sebel PS: Development and clinical application of electroencephalographic bispectrum monitoring. *Anesthesiology* 2000; 93:1336-44.
2. Todd MM: EEGs, EEG processing, and the bispectral index. *Anesthesiology* 1998; 89:815-7.
3. Courtin RF, Bickford RG, Faulconer A: The classification and significance of electroencephalographic patterns produced by nitrous oxide-ether anesthesia during surgical operations. *Mayo Clin Proc* 1950; 25:197-206.
4. Kiersey DK, Bickford RG, Faulconer A: Electroencephalographic patterns produced by thiopental sodium during surgical operations: description and classification. *Br J Anaesth* 1951; 23:141-152.
5. Possati S, Faulconer A, Bickford RG, Hunter

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RC: Electroencephalographic patterns during anesthesia with cyclopropane: correlation with concentration of cyclopropane in arterial blood. *Anesth Analg* 1953; 32:130-135.

6. Mayo CW, Bickford RG, Faulconer A: Electroencephalographically controlled anesthesia in abdominal surgery. *JAMA* 1950; 144:1081-1083.

7. Caton R: The electric currents of the brain. *Br Med J* 1875; 2:278.

8. Von Marxow EF: Mitteilung betreffend die Physiologie der Hirnrinde. *Zentralbl Physiol* 1890; 4: 537-540

9. Berger H: Über das Elektroencephalogramm des Menschen. *Arch Psychiatr Nervenkr* 1929; 87:527-570.

10. Berger H: Über das Elektroencephalogramm des Menschen. *Arch Psychiatr Nervenkr* 1933; 101:452-469.

11. Gibbs FA, Gibbs EL, Lennox WG: Effect on the electroencephalogram of certain drugs which influence nervous activity. *Arch Int Med* 1937; 60:154-166.

12. Rubin MA, Freeman H: Brain potential changes in man during cyclopropane anesthesia. *J Neurophysiol* 1940; 3:33-42.

13. Brazier MAB, Finesinger JE: Action of barbiturates on cerebral cortex: electroencephalographic studies. *Arch Neurol Psychiatry* 1945; 53:51-58.

14. Martin JT, Faulconer A, Bickford RG: Electroencephalography in Anesthesiology. *Anesthesiology* 1959; 20:359-376.

15. Faulconer A, Bickford RG: Electro-encephalography in Anesthesiology. Springfield, Charles C. Thomas, 1960, p. 66.

16. Faulconer A: Correlation of concentrations of ether in arterial blood with electroencephalographic patterns occurring during ether-oxygen and during nitrous oxide, oxygen and ether anesthesia of human surgical patients. *Anesthesiol-*

*ogy* 1952; 13:361-369.

17. Snow J: On chloroform and other anaesthetics: Their action and administration. London, John Churchill, 1858, p. 85.

18. Bickford RG: Automatic electroencephalographic control of general anesthesia. *Electroencephalogr Clin Neurophysiol* 1950; 2:93-96.

19. Soltero DE, Faulconer A, Bickford RG: The clinical application of automatic anesthesia. *Anesthesiology* 1951; 12:574-582.

20. Faulconer A, Bickford RG: Electroencephalography in Anesthesiology. Springfield, Charles C. Thomas, 1960, pp. 72-77.

21. Galla SJ, Rocco AG, Vandam LD: Evaluation of the traditional signs and stages of anesthesia: an electroencephalographic and clinical study. *Anesthesiology* 1958; 19:328-338.

22. Faulconer A, Bickford RG: Electroencephalography in Anesthesiology. Springfield, Charles C. Thomas, 1960, p. 79.

23. Prys-Roberts C: Anaesthesia: a practical or impractical construct? *Br J Anaesth* 1987; 59:1341-5.

24. Kissin I: General anesthetic action: an obsolete notion? *Anesth Analg* 1993; 76:215-8.

25. Eger EI, 2nd: Minimum alveolar anesthetic concentration: a standard of anesthetic potency. *Anesthesiology* 1965; 26:756-63.

26. Quasha AL, Eger EI, 2nd, Tinker JH: Determination and applications of MAC. *Anesthesiology* 1980; 53:315-34.

27. Dwyer RC, Rampil IJ, Eger EI, 2nd, Bennett HL: The electroencephalogram does not predict depth of isoflurane anesthesia. *Anesthesiology* 1994; 81:403-9.

28. Drummond JC, Brann CA, Perkins DE, Wolfe DE: A comparison of median frequency, spectral edge frequency, a frequency band power ratio, total power, and dominance shift in the determination of depth of anesthesia. *Acta Anaesthesiol Scand* 1991; 35:693-9.

29. Mantzaris H, Kenny GN: Auditory evoked

potential index: a quantitative measure of changes in auditory evoked potentials during general anesthesia. *Anaesthesia* 1997; 52:1030-6.

30. Ghouri AF, Monk TG, White PF: Electroencephalogram spectral edge frequency, lower esophageal contractility, and autonomic responsiveness during general anesthesia. *J Clin Monit* 1993; 9:176-85.

31. Drummond JC: Monitoring depth of anesthesia: with emphasis on the application of the bispectral index and the middle latency auditory evoked response to the prevention of recall. *Anesthesiology* 2000; 93:876-82.

32. Glass PS, Bloom M, Kearse L, Rosow C, Sebel P, Manberg P: Bispectral analysis measures sedation and memory effects of propofol, midazolam, isoflurane, and alfentanil in healthy volunteers. *Anesthesiology* 1997; 86:836-47.

33. Sebel PS, Lang E, Rampil IJ, White PF, Cork R, Jopling M, Smith NT, Glass PS, Manberg P: A multicenter study of bispectral electroencephalogram analysis for monitoring anesthetic effect. *Anesth Analg* 1997; 84:891-9.

34. Mychaskiw G, 2nd, Horowitz M, Sachdev V, Heath BJ: Explicit intraoperative recall at a Bispectral Index of 47. *Anesth Analg* 2001; 92:808-9.

35. O'Connor MF, Daves SM, Tung A, Cook RI, Thisted R, Apfelbaum J: BIS monitoring to prevent awareness during general anesthesia. *Anesthesiology* 2001; 94:520-2.

36. Rampil IJ, Mason P, Singh H: Anesthetic potency (MAC) is independent of forebrain structures in the rat. *Anesthesiology* 1993; 78:707-12.

37. Kendig JJ: Spinal cord as a site of anesthetic action. *Anesthesiology* 1993; 79:1161-2.

38. Rampil IJ: Anesthetic potency is not altered after hypothermic spinal cord transection in rats. *Anesthesiology* 1994; 80:606-10.

39. Antognini JF, Schwartz K: Exaggerated anesthetic requirements in the preferentially anesthetized brain. *Anesthesiology* 1993; 79:1244-9.

## Anesthesia History Association Sixth Annual Resident Essay Contest

The Anesthesia History Association (AHA) sponsors an annual Resident Essay Contest with the prize presented at the ASA Annual Meeting.

A 1,500-3,000-word essay related to the history of anesthesia, pain management or critical care should be submitted to:

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The entrant must have written the essay either during his/her residency/fellowship or within one year of completion of residency/fellowship. Residents/Fellows in any nation are eligible, but the essay MUST be submitted in English. All submissions must be typewritten.

An honorarium of \$500.00 and a certificate will be awarded at the AHA's annual dinner meeting at the ASA.

The award-winning residents will be invited to present their essays in person at the annual spring meeting of the AHA and their work will be published in the Bulletin of Anesthesia History.

**All entries must be received on or before August 15, 2002.**

# MedNuggets

by Fred J. Spielman, M.D.

Professor

Department of Anesthesiology, University of North Carolina

One has heard among the anesthetists a certain amount of rather heated discussion as to the place of nurse anesthetist.

— Frank H. Lahey  
*The Surgical Clinics of North America* 11:227, 1931

In obstetric anaesthesia we believe that the mother is of too much importance to be given to the average trained nurse, or average hospital resident, and that even in spontaneous parturition the services of a skilled anaesthetist should be demanded.

— Edward P. Davis  
*Surgery, Gynecology and Obstetrics* 31:601, 1920

We must show them (administrators) that unless anesthesiology is permitted to grow as a specialty with a patient-physician relationship similar to that existing in other specialties, it will revert to a technical status.

— Editorial  
*Anesthesiology* 7:668, 1946

Obviously the advance of surgery depends on the progress of the specialty of anesthesia, and yet it is too little recognized that the growth of the individual surgeon is dependent upon the skill of his anesthetist.

— Frances E. Haines  
*Anesthesia and Analgesia* 6:25, 1927

In the past, the surgeon had adopted the attitude that he alone assumed full responsibility for the patient and that every phase of the operative procedure, including the administration of the anaesthetic, must be under his direction. However, if the patient failed to survive the operation, the anaesthetist was expected to assume complete responsibility for the unexpected fatality!

— P.H.T. Thorlakson  
*Canadian Medical Association Journal* 55:489, 1946

Proper preoperative care is many times more important than the use of any particular anesthetic agent.

— John B. Dillon  
*Journal of the American Medical Association* 133:829, 1947

The surgeon should never force the decision as to the type of anesthetic agent used or how it is given. The surgeon would resent being told he had to do an operation in a certain way if he knew that in some other way his knowledge and skill could be applied to give the patient a better result with less risk.

— Erwin R. Schmidt  
*Surgery* 6:177, 1939

The reasonable fit patient, like the laboratory animal, can survive physiological insults of striking intensity, and in this I include bad anaesthesia.

— R.R. Macintosh  
*British Journal of Anaesthesia* 21:107, 1948

As with many things accepted today as commonplace, as having existed always, anesthesia began in a small way and with a relatively few agents, to blossom forth and fructify into a manifold and ingenious multiplicity of methods, ever keeping step with surgical progress, stride for stride.

— Editorial  
*American Journal of Surgery* 9:142, 1930

As soon as hospitals begin to pay adequate salaries for the service of doctors trained in anesthesiology they will receive the important benefits of better anesthetics.

— E.C. Drash  
*Virginia Medical Monthly* 74:394, 1947

Since the earliest days in anaesthesia, respiration has provided helpful signs for those who conduct fellow human beings on journeys through unconsciousness. We have no reason to suspect that the last secret has been revealed, that no more useful information is forthcoming. Let us then apply ourselves with renewed vigour to the study of respiration, and progress in anaesthesia will surely result.

— H.J.V. Morton  
*Anaesthesia* 5:112, 1950

It is becoming increasingly more difficult to define the poor-risk patient. With present day skilled internists, surgeons, and anesthesiologists it is rare to deny

patients any necessary operations.

— Charles S. Coakley  
*American Surgeon* 21:800, 1955

It is our belief that deaths which occur during spinal anaesthesia are primarily due to cardiac dilatation and respiratory failure. We are of the opinion that debility associated with high temperatures are factors definitely unfavorable to the employment of this type of anaesthesia. We believe that fever produces changes in the cardiac musculature and in the respiratory center in the brain which tends to make patients more susceptible to the drug.

— Joseph A. Lazarus  
*Annals of Surgery* 97:757, 1933

Expertness of the grade necessary for the employment of these various types of highly refined anesthesia will, of necessity, command salaries of considerable size, and I would, therefore, call your attention to the fact that sometime within the fairly near future, the problem of full-time position anesthetists commanding fairly high salaries must be met by hospital trustees and surgeons, if they wish to keep their surgery up to the standards of progress.

— Frank H. Lahey  
*New England Journal of Medicine* 207:725, 1932

If but a few members of the younger generation of the highest integrity and competence can but see the opportunity and decide to spend their lives and efforts in the service of anaesthesia, the future is bright indeed.

— Noel A. Gillespie  
The History of Surgical Anesthesia (Thomas E. Keys) p. 171, 1945

# Report on the Ralph Waters 75<sup>th</sup> Anniversary Meeting

by Selma H. Calmes, M.D.

Chair

Department of Anesthesiology, Olive View-UCLA Medical Center

A meeting celebrating the 75<sup>th</sup> anniversary of the beginning of academic anesthesia was held in Madison, Wisconsin, June 6-8, 2002. The meeting marked the arrival of Dr. Ralph Waters in February, 1927, at the University of Wisconsin as chair of the division of anesthesia. The Waters department went on to train the leaders of our specialty and still plays an important role today through descendants of the original Waters trainees. Meeting sponsors were the Wood Library-Museum of Anesthesiology, the Anesthesia History Association, the History of Anaesthesia Society (Great Britain), the Department of Anesthesiology at the University of Wisconsin and the Wisconsin Society of Anesthesiologists. Aqualumni (those trained by Ralph Waters) who attended were Drs. Lucien Morris of Bainbridge Island, WA; Carlos Parlsoe of Sao Paulo, Brazil, and Merel Harmel of Chapel Hill, NC. Videotaped messages were received from Aqualumni Drs. Jone Wu of China and Torsten Gordh of Sweden. The remaining Aqualumna, Dr. Rosalie Wilhelm of Oakland, CA, was unable to attend. Other attendees included large contingents from Great Britain and the Wisconsin Society

University of Wisconsin (UW) Medical School began by announcing the new Ralph M. Waters Chair which was awarded to current UW department chair, Dr. Susan L. Goelzer. This new chair designation had been voted on by the Regents of the University that very day. Dr. Robert Joy, Professor Emeritus and founding chairman of the Department of Medical History at the Uniformed Services University of the Health Sciences, was the open-

delphia presented some current issues of professionalism (the meeting's subtitle was "Professionalism in Anesthesiology, A Celebration of 75 Years). More papers followed in the afternoon.

The Friday night banquet included two of the Waters' children and their families. On Saturday, Sir Keith Sykes presented the effect of Waters on British anesthesia. The Saturday lunch program was dramatic, featuring videos from international

Aqualumni who were unable to attend, Drs. Jone Wu of China and Torsten Gordh, Sr. of Sweden. Both trained at Madison and then went back to their own countries to establish modern anesthesia practice under difficult circumstances. Torsten Gordh, Jr., also an anesthesiologist and chair of the Department of Anesthesiology at Uppsala University, Sweden, introduced his father's videotape.

This meeting generated some unusually creative papers. An example was "Plant-

ing the Seed: Ralph Waters and the Class of '45" by LeRoy Misuraca of Long Beach, CA. The class of '45 was the last class of the UW Medical School class to be lectured to by Dr. Waters. Ten of the 73 graduates entered anesthesia. Dr. Misuraca, a

*Dr. Torsten Gordh, Jr. introduces his father's videotape.*



*Dr. Lucien Morris and Barbara and Ray Pfeifer. Barbara Pfeifer is the daughter of Ralph Waters.*

ing speaker, reviewing the history of teaching medical history. A reception was held in a side room to the Senate Chambers afterwards.

The next day, Dr. Ted Smith reviewed Madison in 1927 and why the UW Medical School might have been the stimulus for the development of academic anesthesia. Three simultaneous sessions of papers followed, including sessions related to the careers of important Aqualumni

such as Emery Rovenstine, Robert Dripps, Austin Lamont, William Neff and Virginia Apgar. At lunch, Dr. Alan Jay Schwartz of the Children's Hospital of Phila-



*UW department chair, Dr. Susan L. Goelzer*

of Anesthesiologists.

The opening event was held in the Senate Chambers of the Wisconsin State Capitol. The building had been recently renovated and was a grand and striking location for the opening. The dean of the



member of the class of '45, did a survey of remaining class members and led a panel discussion on the situation in relation to medical students and anesthesia training at that time. Another was Dr. David Wilkinson's thoughts on receiving Dr. J. Alfred Lee's copy of the first edition of *Selected Scientific Papers and Addresses of Ralph Milton Waters, MD*, published when Waters received his honorary degree of Doctor of Science from his medical alma mater, Case Western Reserve, in 1957. Other papers were on people related to the Wisconsin department, such as pharmacologist Chauncey Leake and surgeon Erwin Schmidt.

Mementos of the meeting included two books: *Anesthesia from Colonial Times: A History of Anesthesia at the University of Pennsylvania* by James Eckenhoff and *Scientific Papers and Addresses of Ralph Milton Waters, MD*. The first was a reprint of the original volume printed in 1966. The reprinting was organized and funded by Dr. David Lai of Boston. This has an introduction by Waters. Attendees also received a copy of the "Waters Tree." This was developed by Aqualumnus Dr. Lucien Morris, to show the importance of the Waters' department trainees in training the future leaders of anesthesia. Proceedings of the meeting are to be published by Wood Library-Museum.

This meeting will be the only one of its kind. Dr. Lucien Morris had the idea for the meeting and worked tirelessly to get it going. Dr. Mark Schroeder of the UW Department of Anesthesiology was the "worker bee" at the local level, supported by the university's CME office. A.J. Wright of the U. of Alabama at Birmingham supported the meeting by hosting the meeting's website. Congratulations to all who were involved in planning and carrying out the meeting! It was a great success.

*Dr. John Severinghaus and Dr. Robert Buechel*



*Dr. Carlos Parsloe, Dr. Gordon Garnett, and Dr. Lucien Morris*



*Dr. William Hammonds, Dr. Charles Tandy, Dr. Doris K. Cope, Dr. James Arens, and Dr. Alan Sessler*

*Dr. Joseph Rupreht, Dr. Mark Schroeder, and Dr. Adrian Padfield.*





*Dr. Merel Harmel, Prof. J.P. Payne, and Dr. Ken Sugioka*



*Prof. J.P. Payne, Dr. Barry Baker, and Dr. Jonathan Berman, paparazzi photographer*



*Dr. Thomas Boulton and Dr. Charles Poindexter*



*Dr. Felix Fernandes and Dr. John Pring*



*Dr. Darwin Diel Waters, son of Ralph Waters, and Dr. John Steinhaus*

*Dr. Neil Adams, Dr. Jean Horton, Dr. Mark Schroeder, and Dr. Ian McLellan*



*Photographs by Dr. Jonathan Berman, Dr. Mark Schroeder, Dr. Adolph Giesecke, Patrick Sim, and Jim Berkvam Photography*

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# The Syringe: Getting to the Point

by Fred J. Spielman, M.D.

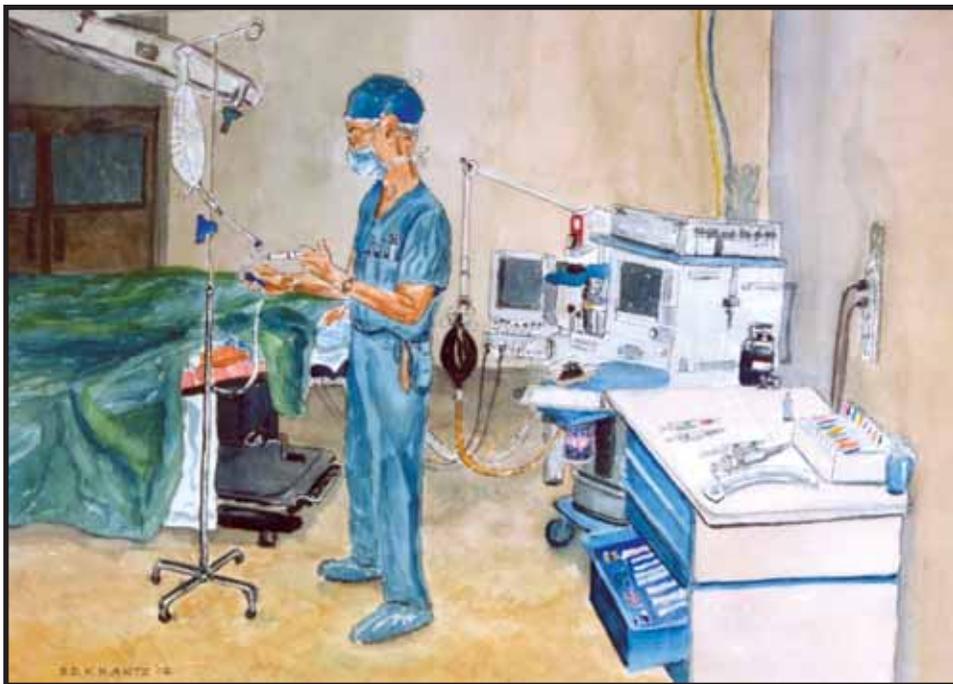
Professor

Department of Anesthesiology, University of North Carolina

Unique tools, devices, and instruments identify specific health care workers, and the syringe is an icon of the anesthesia care team. Regardless of how and where we practice, this piece of equipment is constantly used to draw up and inject drugs, aspirate blood, perform nerve blocks, and place intravenous and arterial catheters. Anesthesia care today would be impossible without an abundance of sterile, well-made syringes in a wide variety of sizes.

The development of a way to make hypodermic (under the skin, from the Greek) injections was motivated by the desire to deliver medications quickly and precisely into the bloodstream. Early physicians gave drugs by enemas, suppositories, intraurethral and intrauterine injections, and inhaled medicated steam or smoke; they even rubbed drugs onto the patient's tongue. Medication was delivered via the skin using baths, liniments, and plasters. Aggressive techniques included the use of vesicants to blister the epidermis; medications were then applied to the denuded skin in the form a powder, ointment, or solution. Dr. G.V. Lafargue gave morphine to his patients by dipping a vaccination lancet in the narcotic and plunging it under the skin.

Most historians credit Dr. Alexander Wood, President and Secretary of the Royal College of Physicians, Edinburgh, as the first person to introduce the practice of using a syringe and hollow needle to administer medications. In 1855, the Scottish physician published a paper in the *Edinburgh Medical and Surgical Journal*, "New method of treating neuralgia by the direct application of opiates to the painful points." Dr. Wood's patient was an 80-year-old woman who suffered from cervicobrachial neuralgia. He injected her with 20 drops of vinous solution of morphia (morphine dissolved in sherry wine) at a point on her shoulder where the pain was most severe. Wood naively thought that the morphine's most important site of action was on the nerves in the vicinity of the injection. Wood visited her the next morning, and was "...a little annoyed to find that she never wak-



*Watercolor (untitled) by Sandy Krantz. Reproduced by kind permission of the artist.*

ened; the breathing was also somewhat deep, and she was aroused with difficulty." Historians estimate that he injected her with approximately 24 mg of morphine, or about 0.5 mg/kg!

Wood and his colleagues believed that local administration of morphine was harmless, and for many years didn't realize that it caused narcotic addiction. Shortly after Wood's publication, morphine was frequently self-administered by patients or their servants or physicians in an attempt to treat a wide variety of complaints including hysteria, delirium, gout, and fever. Charles Hunter, a London surgeon, recommended morphine injections "...as a nerve tonic in cases of great nervous exhaustion, or of irritability or great mental depression." Dr. Hunter understood the full potential of using injections to administer a variety of drugs in the hope of relieving a wide range of symptoms and diseases. He injected narcotics away from the location of the pain, and found that this produced exactly the same therapeutic effect. Hunter's research confirmed the worth of the hypodermic method and significantly broadened its popularity and application. In addition to morphine,

drugs such as atropine and strychnine could be given orally without side effects. In 1865 the *London Medical Times and Gazette* reported on a Professor Nussbaum of Munich who, in an attempt to treat his neuralgia, "...had injected morphia under his own skin more than 2000 times – sometimes to the extent of five grains (300 mg) of morphia in twenty-four hours."

In 1870 Thomas Clifford Allbutt was the first person to speak publicly about the problem of addiction: "We are now often consulted by patients who have been injecting themselves daily or more than daily during long periods of time, for neuralgias which seem, nevertheless, as far from cure as they were at the outset." By the 1880s the practice was declining due to recognition of morphine addiction, but by then, many doctors were as addicted as their patients. Infection, another complication of the repeated use of syringes, occurred because equipment was not properly sterilized, and fungus growth was pervasive in the aqueous preparations of morphine. In 1880 historian Kane wrote about morphinists, "In some of these persons the condition of the body is terrible. Abscesses are to be seen at every stage, from those

just forming to those just healing or healed. Patches of gangrene of various sizes cover the body everywhere."

Early syringes were rudimentary and unsophisticated in construction. Assembled with glass, metal, rubber, and leather, they were not calibrated. The needles were dull and before inserting them, physicians had to make incisions with trocars and lancets.

In the decades after Dr. Wood's publication, several Frenchmen made modifications to the design of the syringe, and the instrument became easier to use, safer, and less painful. Pravaz and Behier included a screw-driven piston to a glass barrel. Each complete turn of the screw injected two minims (0.123 mL) of fluid. Delore constructed a syringe with "wings" that helped steady the instrument during injection. Luer, a German living in Paris, used a piston barrel and dispensed with the screw action for attaching the needle. His simple tapered end, or push fitting, remains the most common syringe fitting in use. Needles were beveled and made sharper. Beautiful and delicate syringes were constructed to fit cases small enough to slip into a gentleman's waistcoat pocket.

One of the most important changes in syringes occurred in Paris with the invention and manufacture of the Luer all-glass syringe in about 1896. Two years later the American patent was sold to Becton, Dickinson & Company. On October 8, 1898 Maxwell Becton made the first sale of one of these syringes to Z.D. Gilman of Washington, D.C. for \$2.50. The glass syringe underwent continued improvements, including the addition of finger and thumb rests and rings to give the operator a firmer grip, colored glass fused to the end of the barrel to facilitate quick measurements, and smoother grinding of the glass for a longer-lasting, tighter fit. Of great import was the use of alkali-free hard glass, such as Pyrex. This glass has an extreme resistance to the erosion caused by sterilizations, medications, and repeated use.

An unexpected consequence of widespread syringe use was transmission of disease. In 1943 the Medical Society for the Study of Venereal Diseases noted that many patients who were treated for syphilis also suffered from hepatitis. Two military units recorded a jaundice incidence between 50% and 75% six months after commencement of therapy. Viral hepatitis was concluded to be transmitted after improper sterilization of the multi-use syringes used to treat sexually transmitted disease. The injection and phlebotomy

equipment was not changed between patients, because of acute shortages and poor understanding of the need for sterilization protocol. Motivated in part by the outbreak of infectious diseases, disposable glass and plastic syringes were manufactured in the late 1950s and early 1960s, respectively. Unfortunately, adherence to sterile technique is not universal. As recently as the 1990s, non-sterile syringes and needles were largely responsible for over 2000 cases of HIV infection in Romanian children and infants.

The painting that accompanies this essay unmistakably emphasizes the prevalence and importance of syringes to those who administer anesthesia. The true-to-life watercolor was created by Sandy Krantz, a gifted and skilled artist, at the request of the author. Members of her mother's family were artists, and encouraged and reinforced Ms. Krantz's interest in creativity. Sandy Krantz excels at painting nature scenes and designing greeting cards. She is an operating room nurse in Abbotsford, British Columbia. Abbotsford, known as "the berry capital of the free world" has approximately 100,000 people. It is situated in the lush and fertile Fraser Valley. Ms. Krantz is married to the accomplished and internationally renowned flutist, Mr. Larry Krantz. The hospital in which she works has six operating rooms and 200 beds. The anaesthetist in the painting is Dr. Paul Forrest, FRCP, DABA, one of seven anaesthetists who work in the hospital. Quick and easy access to syringes is vital to Dr. Forrest. They are strategically placed on the top and in the drawers of the anesthesia cart, as well as in his shirt pocket. The ability to provide safe and complete analgesia and anesthesia today is possible because of the modest piece of equipment that has been refined and adapted over the past 150 years.

#### Suggested Reading

1. Schwidetzky O. History of needles and syringes. *Anesth Analg* 1944; 23:34-38.
  2. Howard-Jones N. A critical study of the origins and early development of hypodermic medication. *J Hist Med* 1947; 2:201-249.
  3. Howard-Jones N. The origins of hypodermic medication. *Scientific American* 1971; 224:96-102.
  4. Haller JS. Hypodermic medication. *NYS J Med* 1981; 1671-1679.
- Brunton D. A question of priority: Alexander Wood, Charles Hunter and the hypodermic method. *Proc R Coll Physicians Edinb* 2000; 30:349-351.

## THE WOOD LIBRARY-MUSEUM

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### ANESTHESIOLOGY

#### Holding Court with the Ghost of Gilman Terrace:

#### Selected Writings of Ralph Milton Waters, MD

and

#### The Aqualumni Family Tree Poster

To help celebrate the 75<sup>th</sup> anniversary of Ralph M. Waters and Professionalism in Anesthesiology, which was held recently in Madison, WI, the Wood Library-Museum of Anesthesiology has published a new edition of Dr. Waters' papers, titled, *Holding Court with the Ghost of Gilman Terrace*, edited by David Lai, M.D. with a Foreword by Donald Caton, M.D. The Waters papers are organized in six subjects with an easy reference to the actual papers in the book. A limited quantity of this special edition is still available at the Wood Library-Museum at \$30 per copy, until the entire inventory is depleted.

Also printed for the Ralph Waters and Professionalism in Anesthesiology celebration is a 10" x 15" poster of the Aqualumni Family Tree, designed by Lucien E. Morris, M.D. and Jeanne P. Morris M.A. This famous genealogy elaborately traces the professional roots of pioneer anesthesiologists of the Ralph Waters tradition from which a majority of anesthesiology leaders today could claim their professional lineage. Ideal for framing for the anesthesia office, this poster is available at the Wood Library-Museum at \$5.00 per copy.

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# From the Literature

by A.J. Wright, M.L.S.

Department of Anesthesiology Library, University of Alabama at Birmingham

Note: In general, I have not examined articles that do not include a notation for the number of references, illustrations, etc. I do examine most books and book chapters. Books can be listed in this column more than once as new reviews appear. Older articles are included as I work through a large backlog of materials. Some listings are not directly related to anesthesia, pain or critical care but concern individuals important in the history of the specialty [i.e., Harvey Cushing or William Halsted]. Non-English articles are so indicated.

Columns for the past several years are available in the "Anesthesia History Files" at <http://www.anes.uab.edu/aneshist/aneshist.htm> as "Recent Articles on Anesthesia History." I urge readers to send me any citations, especially those not in English, that I may otherwise miss!—A.J. Wright [ajwright@uab.edu](mailto:ajwright@uab.edu)

## Books

Bradburne JM, ed. Blood: Art, Power, Politics, and Pathology. London: Prestel, 2002. 271 pp.

Fenster JM. Ether Day: The Strange Tale of America's Greatest Medical Discovery and the Haunted Men Who Made It. New York: Harper Collins, 2001. 278 pp. [rev. Eger EI II. *Anesthesiology* 96(5):1280, May 2002; Hardy R. NonFictionReviews.com <http://www.nonfictionreviews.com/article1214.html>; brief excerpts on National Public Radio's program "All Things Considered, August 6, 2001]

Dion K. Histoire de la Contention et de l'Anesthésie Veterinaires. Doctoral thesis, Ecole Nationale Veterinaire d'Alfort, 2001. 131 pp.

Harris FH. Adjusting Expectations: Chiropractic, Pain and an Evolving American Health Care System. Ph.D. dissertation, New School University, 2000. 297 pp.

Hills RL. James Watt: His Time in Scotland, 1736-1774. Ashbourne, England: Landmark Publishing, 2002. 416 pp. [Volume 2 of this biography scheduled for 2003]

Hodgkiss A. From Lesion to Metaphor: Chronic Pain in British, French and German Medical Writings, 1800-1914. Amsterdam: Editions Rodopi, 2000. 218 pp. [Clio Medica vol. 58; rev. Morris DB. *Bull Hist Med* 76:165-166, 2002]

Jeffreys D. Wonderdrug: The Remarkable History of Aspirin. Bloomsbury UK, scheduled for 2004.

McKenzie A. A History of Anaesthesia through Postage Stamps. Edinburgh: Maclain Dubois, 2000. 148 pp. [rev. Van Wijhe M. *Eur J Anaesthesiol* 19:234, 2002]

Sheffield C. The Amazing Dr. Darwin. Baen Books, 2002. 336 pp. [novel based on the life of Dr. Erasmus Darwin, who among many other achievements support Thomas Beddoes' gas research at the Pneumatic Medical Institute in

Bristol, England]

Stoljarenko P Yu. The Evolution of Anesthetization in Stomatology (From Antiquity to Modernity). Samara, Russia: Samara State Medical University, 2001. 172 pp. [122 illus.; Russian]

Stoljarenko P Yu. The History of Lidocaine. Samara, Russia: Samara State Medical University, 2001. 36 pp. [16 illus.; Russian]

Stoljarenko P Yu. Vasily Konstantinovich Annrep—Founder of Local Anesthesia. Samara, Russia: Samara State Medical University, 2002. 32 pp. [portrait, 6 illus.]

Tinniswood A. His Invention So Fertile: A Life of Christopher Wren. Oxford University Press, 2002. [rev. Hardy R. NonfictionReviews.com <http://www.nonfictionreviews.com/article1276.html>; rev. Glassman P. *Library J* January 2002, p. 99. I don't know if this book cover Wren's work with intravenous injections]

## Articles and Book Chapters

Allan N. Remembering Roy Porter: a celebration of a life fulfilled. *Friends of the Wellcome Library and Centre for the History of Medicine Newsletter* no. 26:1, spring 2002 [obituary]

Ball C, Westhorpe R. Intravenous induction agents: ketamine. *Anaesth Intens Care* 30(2):115, April 2002 [illus., 6 refs.; Cover Note series]

Ball C, Westhorpe R. Intravenous induction agents—Propanidid. *Anaesth Intens Care* 30(3):261, June 2002 [illus., 5 refs.; Cover Note series]

Baron P. Une famille de dentistes au XVIIIeme siecle: les Leroy de la Faudignere. *Histoire des Sciences Medicales* 36(1):55-73, January-March 2002 [French; has some material on analgesia]

Battistini G. I pionieri dell'anestesia. *Giornale di Medicina Militare* 149(5-6):291-295, September-December 1999

Bennett EJ. Anaesthesia in the Dili General Hospital, East Timor. *Anaesth Intens Care* 29:530-534, 2001 [1 illus., 3 tables, 2 refs.]

Berthelsen PG. On the first successful restoration of the beat of the heart, by open-chest massage, after collapse from chloroform inhalation. *Bibliotek for Laeger* 194(1):58-73, March 2002 [Danish]

Biderman A, Herman J. Did Weir Mitchell anticipate important concepts in ambulatory care and clinical epidemiology? *J Clin Epidemiol* 55:418-421, 2002 [27 refs.]

Bradley JP, Lee D. Anaesthesia in the United Nations military hospital, Dili, East Timor. *Anaesth Intens Care* 29:527-529, 2001 [1 illus., 4 tables, 2 refs.]

Burkle CM, Sands RP Jr., Bacon DR. Beyond blocks: the history of the development of techniques in regional anesthesia. In: Raj PP, ed. *Textbook of Regional Anesthesia*. New York: Churchill Livingstone, 2002, pp 22-32 [10 illus., 67 refs.]

Cavenaile R. Lanesthésie chirurgicale dans l'antiquité Greco-Romaine. *Medicina nei Secoli* 13(1):25-46, 2001

Coni N. Medicine and the Spanish Civil War. *J Roy Soc Med* 95:147-150, March 2002 [includes blood transfusion; 25 refs.]

Cooper P. Humphry Davy: a Penzance prodigy. *Pharmaceut J* 264:920-921, 2000

Desbarax P. Morton's design of the early ether vaporisers. *Anaesthesia* 57:463-469, 2002 [5 illus., 2 appendices, 14 refs.]

Dickenson AH. Gate control theory of pain stands the test of time. *Br J Anaesth* 88(6):755-757, June 2002 [9 refs.]

Dreyfuss M. Scott Augustine, MD, has dedicated his life to helping others. *Anesthesiology Review* 28(5):40, May 2002

Dubb A. Women in medicine: Virginia Apgar (1909-1974). *Adler Museum Bulletin* 27(2-3):18-19, November 2001

Ellis H. A History of Surgery. San Francisco: Greenwich Medical Media, 2001. 264 pp. [includes material on anesthesia; rev. Toledo-Pereyra LH. *JAMA* 287:2147-2148, 2002]

Fromer M. Changing the face of anesthesiology: the influence of the WWII short courses. *ASA Annual Meeting News*, October 13-17, 2001, p. 7

Gomart E. Methadone: six effects in search of a substance. *Social Studies of Science* 32(1):93-135, February 2002

Gourevitch D. La triade anesthésique dans le monde greco-romain. *Cah Anesthesiol* 49:309-314, 2001

Jacob MC, Sauter MJ. Why did Humphry Davy and associates not pursue the pain-alleviating effects of nitrous oxide? *J Hist Med Allied Sci* 57(2):161-176, April 2002 [54 refs.]

Kean CT, Frances FT, Chung, MD, is transforming ambulatory anesthesia. *Anesthesiology News* 28(5):41, 45, May 2002 [illus., table]

Kety SS, Forster RE, Julius H. Comroe, Jr.: March 13, 1911-July 31, 1984. *Biographical Memoirs* 79:66-83, 2001

Knight PR III, Bacon DR. An unexplained death: Hannah Greener and chloroform. *Anesthesiology* 96(5):1250-1253, May 2002 [1 illus., 17 refs.]

Kopp SL, Horlocker TT, Bacon DR. The contribution of John Lundy in the development of peripheral and neuraxial nerve blocks at the Mayo Clinic: 1925-1940. *Reg Anesth Pain Med* 27(3):322-326, May-June 2002 [4 illus., 11 refs.]

Kuhnert N. Hundert Jahre Aspirin: die Geschichte des wohl erfolgreichsten Medikaments des letzten Jahrhunderts. *Pharmazie in unserer Zeit* 29(1):32-39, 2000

Lai DC. History of pain relief. In: Warfield CA, Fausett HJ, eds. *Manual of Pain Management*. 2nd ed. Lippincott Williams and Wilkins, 2002, pp. 3-5 [15 "Selected Readings"]

Lahoud GYG. Reflection: end of an era and a new beginning! *Anaesthesia* 57:412-413, 2002 [4

refs.; dental anesthesia]

Lanier K. Anesthesiologist Balovich dies at 81. *Mobile [Alabama] Register*, 17 April 2002 [Obituary for Dr. Vernon Nicholas Balovich]

Lawrence G. The hypodermic syringe. *Lancet* 359:1074, March 23, 2002

Lindahl SGE. Phlogiston-fire air-oxygen. The fascinating story of an 18th century discovery. *Acta Anaesth Scand* 46:1, 2002 [2 refs.; editorial]

Link J. World War II fundamentally changed the field of anesthesiology. *Anesthesiology News* 27(10):32-33, October 2001 [based on Waisel DB. *Anesthesiology* 94:907-914, 2001]

Nutton V. Roy Porter 1946-2002. *Friends of the Wellcome Library and Centre for the History of Medicine Newsletter* no. 26:6-7, spring 2002 [obituary]

Pembroke L. A brief history of hypotensive epidural anesthesia. *Anesthesiology News* 28(4):48, April 2002

Raj PP. Historical aspects of regional anesthesia. In: Raj PP, ed. *Textbook of Regional An-*

*esthesia*. New York: Churchill Livingstone, 2002, pp 3-21 [8 illus., 126 refs.]

Rovit RL, Couldwell WT. No ordinary time, no ordinary men: the relationship between Harvey Cushing and Franklin D. Roosevelt, 1928-1939. *J Neurosurg* 95:354-368, 2001 [10 illus., "Selected Bibliography"]

Severinghaus JW. Priestley, the furious free thinker of the enlightenment, and Scheele, the taciturn apothecary of Uppsala. *Acta Anaesth Scand* 46:2-9, 2002 [4 illus., 2 refs.]

Simmons JG. *Doctors and Discoveries: Lives that Created Today's Medicine*. Boston: Houghton Mifflin, 2002. [Includes chapters on Morton, pp157-161; Snow, pp 162-164; Cushing, pp 227-231; source notes for each chapter]

Sir James Young Simpson (1811-1870). *Female Patient* 15(1):28-29, January 2002 [2 illus.; Japanese]

Sourkes TL. Magendie and the chemists: the earliest chemical analyses of the cerebrospinal fluid. *J Hist Neurosci* 2002; 11(1):2-10 [4 illus.,

numerous references]

Speck WA. Joseph Priestley's American dream. *Historian* (London, England) no. 73:16-23, spring 2002

Sprigge JS. Sir Humphry Davy; his researches in respiratory physiology and his debt to Antoine Lavoisier. *Anaesthesia* 57:357-364, 2002 [5 illus., 3 tables, 45 refs.]

Sturgess R. Freud, Sherlock Holmes and Coca Cola: the cocaine connection. *Pharmaceut J* 265: 915-917, 2000

Thompson GE. Some historical perspectives on axillary plexus block. *Reg Anesth Pain Med* 27(3):333, May-June 2002 [letter; 4 refs.]

Weaver JM. Two notable pioneers in conscious sedation pass their gifts of pain-free dentistry to another generation. *Anesth Prog* 47: 27-28, 2000 [editorial about the late Drs. Harry Langa and Wayne Hiatt]

Zimmer M. Anesthésie par les courants: premières applications chirurgicales. *Histoire des Sciences Medicales* 36(1):31-53, January-March 2002

## Anesthesia Foundation Book/Multimedia Education Award

The Anesthesia Foundation announces the Book/Multimedia Education Award to be presented 2003 at the American Society of Anesthesiologists Annual Meeting.

This prestigious award will be awarded tri-yearly for excellence and innovation in books or multimedia with significant impact on the science and practice of anesthesiology, critical care, or pain medicine. Multiple authors are eligible with the stipend being divided between the first and senior authors.

The award is \$10,000, plus expenses for winners and guests to attend the Academy of Anesthesiology 2004 Spring meeting in Victoria Island, Canada.

Deadline for receipt of contributions is November 15, 2002.

For further information and specific criterion please contact:

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# Condors over the Alps

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## Introduction

From 1936 through 1939, a small German military contingent, known as the Legion Condor, helped Franco's Nationalists to win the Spanish civil war.<sup>1-4</sup> Some of the Legion's wounded were occasionally flown to Berlin, 1,600 miles away, in 12-hour flights at 20,000 ft. altitude. This was a first in aviation medicine and its details deserve to be better known.

## The Legion Condor (1-4)

In mid-July 1936, Franco flew to Spanish Morocco and rallied to the Nationalist side the Spanish troops of North Africa, which formed the elite of the Spanish army at the time. The blockade of the Straits of Gibraltar by Republican warships forced Franco to airlift his troops to the mainland and he appealed to the German government for air support. Hitler sent him 20 Ju 52s (the world's best cargo planes at the time), a few fighters, and 75 Luftwaffe personnel. By mid-August 1936, the Germans had flown 25,000 troops and 3,000 tons of equipment.

In October 1936, in response to the USSR massive help to the Republicans, Hitler added a large number of planes, 6,500 Luftwaffe personnel, and some ground troops with tanks and guns. Those reinforcements, now called the Legion Condor, had their own uniforms and weapons and were under strict German operational control. They had a medical battalion and 2 field hospitals.

In the fall of 1938, the Legion, impatient with Franco's slow progress, requested and received an increased supply of some of Germany's newest planes, tanks and guns; its enlarged personnel was now rotated to gain combat experience and test new weapons and tactics.

On May 2, 1939, after Franco's victory, the Legion Condor sailed for Hamburg and on June 16, 1939, the 14,000 Germans who had served in Spain paraded before Hitler and a delirious crowd of Berliners. The Legion was then disbanded and its men returned to their regular units.

Spain had cost Germany 200 dead and 500 wounded. Until the legionnaires' arrival in Hamburg the German government and press had denied any German presence in Spain.

## Luftwaffe Activity in Spain

Until the end of 1939, the German medical journals had remained entirely silent about Spain. In January 1940, the *Deutsche Militaerarzt (DMA)*, the official publication of the Wehrmacht's medical service, published 3 articles<sup>5-7</sup> on the successful air evacuation of 2,500 German wounded during the Polish campaign (September 1939). One of those articles,<sup>5</sup> had been written by General E. Hippke, the Chief of the Luftwaffe's Medical Inspectorate. The wounded had been flown to Breslau or Berlin hospitals in 2-3 hour flights at low altitude (3,000 ft), thus sparing them a long and uncomfortable transport over the muddy, primitive Polish roads. All 3 articles gave credit for this successful operation to the Legion Condor and the recent airlift of its wounded. This was the first reference to the Legion and to its medical activity in a German medical publication.

The same issue of the *DMA* also contained an article<sup>8</sup> entitled "Air evacuation of wounded over long distances at high altitudes" by Dr H. Kowalzig, a lieutenant colonel on Dr. Hippke's staff. Kowalzig briefly mentioned that the Luftwaffe had occasionally flown patients and physicians inside Spain but the bulk of his paper dealt with the evacuation of 43 patients to Berlin in direct flights at high altitudes. Although Kowalzig made it clear that this had been a small, experimental operation, his report was extensively quoted in the German and foreign literatures during and after WW 2, thus creating the impression that it had been a large project involving many flights and numerous patients.

Kowalzig's article seems to be the only detailed account of those flights; we have found no other primary source despite an extensive search of the literature and numerous inquiries among German archivists. Kowalzig's paper, unfortunately omits important details.

## Kowalzig's Report

Kowalzig reported the evacuation of 38 patients in 8 flights by Ju 52 ambulance planes. Another 5 patients with minor medical problems were airlifted aboard 2 cargo planes. It is unclear from Kowalzig's article how many ambulance planes were available but another source<sup>4</sup> suggests that

there was only one, a Ju 52 painted white, with Red Cross markings, and matriculated D-AVIA.

The Ju 52 m/3 was a trimotor aircraft with a speed of 130 MPH and, with 2 auxiliary tanks, a fuel capacity of 620 gallons. Those additional tanks, situated in the rear of the cabin, unfortunately reduced the patient carrying capacity and prohibited the installation of any heating device. The cabin was not pressurized and had no inner wall nor insulation against cold or noise. The unsealed door and windows created huge drafts. The crew included 2 pilots, a radio-navigator, and a flight engineer; all were proficient in first aid. The Ju 52 was equipped with blind-flying and radio-directional instruments. Without its auxiliary tanks a Ju 52 carried 8 stretchers and 2 to 4 sitting patients. The stretchers were attached to both walls of the cabin in 2 tiers with a narrow central aisle.

The planes took off from airstrips near the field hospitals in Salamanca or Tablada and refueled in N. Spain, in Italy, or in S. Germany, but under good wind conditions some flew non-stop to Berlin. Those 1,400 to 1,600 mile flights took 10 to 13 hours and were made by blind-flying over the clouds at 20,000 ft. altitudes to avoid the violent winds and air currents and the low ceiling over the Alps, especially during the winter months.

The patients remained aboard on their stretcher for the whole journey. The first flight had made an overnight stop in Majorca where the patients were lodged in a local facility but the transfers took so much time and effort that the experience was never repeated. The planes left Spain shortly before darkness and reached Berlin the next afternoon, thus allowing a few hours of daylight to drive the patients to the local hospitals.

The hazards of high altitudes were already well known in 1936<sup>9,10</sup> and the Germans had used simple but efficient precautions:

A. Air sickness due to turbulence was avoided by flying at high altitudes, choosing skillful pilots, and keeping the patients lying down. Short bouts of mild nausea had occasionally occurred during the descent towards Berlin.

B. Hypoxia: as soon as the piano reached 2,500 to 3,000 ft. the flight engineer placed an oxygen mask on the patients' face. The masks were connected through individual hoses to a central tank situated in the rear of the cabin.

C. Since it was known that low atmospheric pressure expanded the gases trapped in the body cavities and could increase the Intracranial pressure, patients at risk from such complications were excluded.

D. The Germans realized that hypothermia would be the main danger. Their patients, while still in the field hospital, were wrapped in warm clothing and heated blankets then bundled in a special hammock used by the German Navy to transship their wounded. The patients, thus bound to their stretcher, were then driven to the near-by airstrip, loaded aboard the plans, securely attached to the cabin wall, and left undisturbed until they reached Berlin. A urinal had been inserted between the logs and large wads of cotton had been wrapped around the buttocks to serve as diapers. Hot drinks from Thermos flasks and cognac egnogs (two common Wehrmacht's antidotes for hypothermia) were liberally dispensed during the flight.

All patients reached Germany safely and the medical officer or corpsman accompanying the initial flights was later withdrawn thus allowing room for additional patients. The evacuated patients suffered of burns, skull or facial injuries, and complex limb fractures. There were a few serious medical cases, such as a patient with mitral stenosis in heart failure, another with advanced pulmonary tuberculosis, and several cases of severe anemia following multiple injuries. That all patients reached Berlin without complications was attributed to two factors:

a. the preventive measures cited above and

b. patients' selection: patients recently operated or in shock, patients with recent brain injuries or ear problems, or those at risk for hemorrhages or from abdominal distension were excluded.

## Discussion

1. Air evacuation of wounded soldiers was not new in 1936; it had started during WW I but the flights had been short and at low altitude.<sup>9,11</sup> The Luftwaffe's physicians were also very familiar with Leduc's book.<sup>11</sup> J.Leduc, a French surgeon, had

reviewed the charts of wounded soldiers who had been airlifted during the battles against the insurgent Moroccan tribes in 1933. The flights had been short (60 to 150 miles) but the French pilots had occasionally reached 8,000 ft. to overfly the Atlas Mts. Leduc strongly favored air evacuation for emergency surgery but had found high altitudes to be harmful to recently operated patients, and to patients with pneumothoraces, brain traumas, or at risk for gastrointestinal perforation.

2. The German medical literature leaves little doubt that the successful airlifts of the Legion Condor were the main impetus for the creation and the development of an air ambulance service in the Luftwaffe in 1940.<sup>5-7,12</sup> Hippke, the Air Force Medical Inspector had initially been skeptical of such project, as he felt that Germany's future battles would take place near its very frontiers and that the home hospitals could be quickly reached by road or rail.<sup>13</sup> Poland changed his mind and in late September 1939, he ordered the creation of an air evacuation unit and published guidelines for the selection and transport of patients to be airlifted.<sup>12</sup> Those units were considerably expanded later on, during the operations in the Balkans, in Libya, and, especially, in the USSR. By the end of WW 2 the Luftwaffe had evacuated 3 million patients.<sup>10</sup>

3. Neither Kowalzig nor his colleagues have explained the reasons for the Legion's long flights and we are left to speculate:

a. It was Wehrmacht doctrine to send immediately to the rear wounded in need of extensive surgery and prolonged post-operative care. This insured expert treatment, kept the field hospitals free of long term patients and thus highly mobile, and avoided the dispersal of rare specialists over large battlefields. The Legion in Spain had only 2 small field hospitals in Salamanca and Tablada, and no base hospitals nor specialists.

b. The Germans may have been reluctant to send their patients to Spanish hospitals. The memoirs of the German participants in Spain<sup>1-3</sup> suggest that they had little regard for Franco's armed forces and were dismayed by the local socioeconomic and hygienic conditions. The Legion had reserved for its exclusive use the best hotels, restaurants and even brothels.<sup>3</sup> Berlin had also insisted that the Legion be under absolute German control. Long, risky flights may thus have seemed to be a safer alternative to transfers to Spanish facilities.

4. Those long flight at high altitudes though new and experimental, rested on a solid scientific background. Since 1927 the German universities and research institutes had shown great interest in the physiology of aviation.<sup>9,14</sup> When the Luftwaffe took over those facilities in 1935, it vigorously supported those institutions and generously provided personnel and money. Most medical officers of the German Air Force, like their flying colleagues, were young, ambitious and ready to try new methods.<sup>3</sup>

## Conclusions

Contrary to common assumption, the air evacuation by the Legion Condor of some of its wounded to distant German hospitals was a very limited operation involving very few flights and few patients. It, however, was a bold initiative and its success gave the Luftwaffe the impetus to create and develop an air service which served the Wehrmacht well during its campaigns in remote areas and saved many lives.

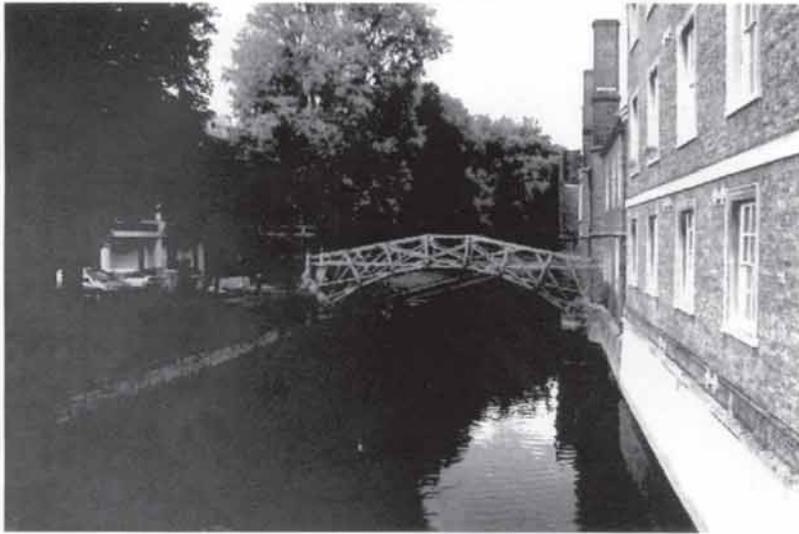
## Bibliography

1. Thomas H. The Spanish Civil War. New York, Modern Library, 2001:891-930, 937-938.
2. Bevoor A. The Spanish Civil War. New York, Penguin, 1982:79-94.
3. Elstob P. Condor Legion. New York, Ballantine, 1973:66-101.
4. Ries K, Ring H. The Legion Condor. West Chester, PA. Schiffer, 1972:74, 86.
5. Hippke E. Ueber den Lufttransport Kranker und Verwundeter. *Der Deutsche Militaerarzt* 1940; 5:1-4.
6. Toennis W. Der Lufttransport von Verwundeten und Kranken als aertzliches Problem. *Der Deutsche Militaerarzt* 1940; 5:5-7.
7. Schmidt F. Verwundetentransport im Flugzeuge. *Der Deutsche Militaerarzt* 1940; 5:7-10.
8. Kowalzig H. Verwundetentransport auf dem Lutwege ueber weite Strecke und im grossen Hoehen. *Der Deutsche Militaerarzt* 1940; 5:10-14.
9. Armstrong MG. Principles and Practice of Aviation Medicine. Baltimore, Williams and Wilkins, 1952:46-53; 195-225; 305-306; 421-422.
10. Schroeder O. Air Evacuation of Wounded. In: German Aviation Medicine in WW 2. Edit: Surgeon General, US Air Force, Washington, DC, Dept of Air Force, 1950:1133-1137.
11. Leduc J. Indications et Contra-Indications du Transport par Avion dans les Affections Chirurgicales de l'Abdomen, du Thorax et du Crane. St Quentin, Imprimeris Moderne, 1934:172-177.
12. Hippke E. Ueber den Aufbau des Sanitaetswesens der ehemalige deutsche Luftwaffe. *Wehrdienst Gesundheit* 1959; 1:54-63.
13. Hippke E. Flugdienst und Krankentransport. *Der Deutsche Militaerarzt* 1936; 1:74-75.
14. Strughold H. Development of Aviation Medicine in Germany. In: German Aviation Medicine in WW2. Edit: Surgeon General, US Air Force, Washington, DC, Dept. of Air Force, 1950:3-11.



# Sixth International Symposium on the History of Anaesthesia

HISTORY OF ANAESTHESIA SOCIETY



The History of Anaesthesia Society is delighted to announce that, in conjunction with the Department of Anaesthesia of the West Suffolk Hospital, they will be hosting the Sixth International Symposium on the History of Anaesthesia in Cambridge from 15<sup>th</sup> to 18<sup>th</sup> September 2005. The meeting will give delegates the unique opportunity to be resident in Queens' College which is centrally placed facing onto the "Backs". The programme is currently being planned and any comments would be welcomed by the Honorary Secretary.

HISTORY OF ANAESTHESIA  
SOCIETY

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# Anesthesia History Association Annual Dinner Meeting



**Monday, October 14, 2002, 6:00 PM**

*The Peabody Orlando*

9801 International Drive

Orlando, FL

*Transportation provided from the Convention Center*

*Featured Presentation*

***Anesthesia, but no Curare***

**Anesthesia Practice during the Korean War**

*by*

**E.S. Siker, M.D.**

Past President, American Society of Anesthesia

Past President, American Board of Anesthesiology

Chairman Emeritus, Dept. of Anesthesiology, The Mercy Hospital of Pittsburgh

Clinical Professor of Anesthesiology, 1972-1994, University of Pittsburgh School of Medicine

## **Menu**

Petite Filet Mignon and Sea Bass Medallions

Chocolate Croissant Bread Pudding

**Cost—\$90.00 Per Person**

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Send check made out to the Anesthesia History Association by **October 4, 2002** to:

Douglas R. Bacon, M.D., M.A.  
Secretary-Treasurer  
Anesthesia History Association  
2121 Northview Lane NE  
Rochester, MN 55096

Name: \_\_\_\_\_

Number attending: \_\_\_\_\_

***No Reservations Will Be Accepted at the Door!***

# This Month in Anesthesia History\*

**July 27:** Feast of Saint Pantaleon, a physician and martyr and patron saint of headache sufferers.

**1730 July 12:** Josiah Wedgwood is born. The English pottery designer and manufacturer was a major financial supporter of Dr. Thomas Beddoes and his Pneumatic Institute near Bristol. Beddoes and Humphry Davy manufactured and experimented with nitrous oxide there in 1799 and 1800. Wedgwood died in 1795, three years before the institute opened. His son Tom participated in those nitrous oxide experiments and, along with Davy, conducted an early experiment in photography around 1800.

**1814 July 19:** Samuel Colt is born. In the 1830s Colt, calling himself "Professor Coult" or "Doctor Coult", toured the

United States giving nitrous oxide demonstrations to raise money to put his revolver prototype into production. Colt died on 10 January 1862.

**1844 July:** William T.G. Morton begins using sulphuric ether as a local anesthetic in his Boston dental practice. The agent was suggested to him by Dr. Charles A. Jackson.

**1865 July 19:** Charles Horace Mayo, co-founder with his brother W.J. of the Mayo Clinic, is born. Mayo is one of the youngest persons on record to administer anesthesia; according to his brother, Charles was giving the A.C.E. mixture at the age of 12 to patients in his father's surgical practice.

**1868 July:** In Paris T.W. Evans success-

fully liquefies nitrous oxide for storage and portability in metal cylinders.

**1868 July 15:** William T.G. Morton dies in New York City. In October, 1846, Morton made the first successful public demonstrations of ether anesthesia at the Massachusetts General Hospital in Boston.

**1876 July 15:** J.T. Clover publishes article in the *British Medical Journal* in which he introduces the nitrous oxide-ether sequence and an apparatus for its administration.

**1900 July:** Oskar Kreis publishes first account of spinal analgesia for vaginal delivery. [Translation of the German original published in *International Journal of Obstetric Anesthesia* 9:174-178, 2000]

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\*For the full calendar, go to [www.anes.uab.edu](http://www.anes.uab.edu)

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## Bulletin of Anesthesia History

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