Thoughts on the Bulletin

David B. Waisel, MD
Associate Professor of Anesthesia, Boston Children's Hospital, Harvard Medical School, Boston, Massachusetts, Editor, Bulletin of Anesthesia History

In this issue of the Bulletin, Mulita and colleagues1 present a 10-year analysis of publication trends for articles about anesthesia history. They conclude that the publication of history articles is “low” at 1.25% of all articles. Even this frequency is inflated. Subtracting the “Cover Notes” of Anesthesia and Intensive Care and the “Reflections” in Anesthesiology leaves a more indicative estimate of about 0.7%.

To be sure, there are legitimate concerns about this article: the absence of factoring in the number of submissions; the lack of comparison to other specialties; and the role of authors’ perceptions of the ability to get published. But these concerns do not outweigh the need to discuss the conclusions.

How legitimate is the value judgment that mainstream journals publish too few history articles? That depends on the mission. While missions of journals vary, the British Medical Journal provides a good summary: “Our mission is to lead the debate on health and to engage, inform, and stimulate doctors, researchers, and other health professionals in ways that will undergird a credible, self-sustaining academic discipline. It will spur interest in history, which will increase publications in mainstream journals. The right Bulletin will undergird a credible, self-sustaining academic discipline.”

Successful academic homes have meaningful journals. A respected Bulletin of Anesthesia History will provide a home for aspiring authors to hone their skills and gain academic credibility. It will spur interest in history, which will increase publications in mainstream journals. The right Bulletin will provide a home for aspiring authors to hone their skills and gain academic credibility. It will spur interest in history, which will increase publications in mainstream journals.

The progenitor of the Bulletin, the Anesthesia History Association Newsletter, was started in 1982 by the first editor, Selma H. Calmes, MD. Dr. Calmes was followed by C. Ron Stephen, MD, and who later passed the pen to my immediate predecessor, Doris K. Cope, MD. These editors (with unflagging support from many others, including Roderick K. Calverley, MD, and A. J. Wright, MLS) brought the Bulletin from a “cut-and-paste” kitchen-table newsletter to being recognized within the history community as the United States journal for anesthesia history.

The next step is to move that recognition into the mainstream academic community. To do so requires investments that are neither simple nor risk-free. So I am asking readers to weigh in. What should the Bulletin be? Whom should it serve? Most importantly, do we want to take that next step?

I invite your thoughts.

References

Publication Trends for Articles Related to the History of Anesthesia: A 10-year Analysis from Six Journals

Avenir Mulita, MD*, Xiaoxia Liu, MS** and Sukumar P. Desai, MD**

*19 Vernon Street, Suite #1, Waltham, Massachusetts; **Department of Anesthesiology, Perioperative and Pain Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts

Disclosure
This work was supported by intramural funds.

Introduction
Anesthesia historians believe they have difficulty in getting their work published in peer reviewed journals devoted to anesthesia. To test the hypothesis of whether such publication bias exists, we conducted a review of all articles published in six journals.

Methods
We examined all articles published between January 2001 and December 2010. In order to enable comparison among journals, articles were categorized as major or minor. We also examined whether there were trends in publication over this period.

Continued on Page 3
1. Monographs: Old citations to historical monographs (including books, audiovisuals, serials, book chapters, and meeting papers) are now in LOCATORplus (locatorplus.gov), NLM’s web-based online public access catalog, where they may be searched separately from now on, along with newly created citations.

2. Journal Articles: Old citations to journals have been moved to PubMed (www.ncbi.nlm.nih.gov/PubMed), NLM’s web-based retrieval system, where they may be searched separately along with newly created citations.

3. Integrated History Searches: NLM has online citations to both types of historical literature—journal articles as well as monographs—again accessible through a single search location, The Gateway (gateway.nlm.nih.gov).

Selma H. Calmes, MD, Founding Editor Emerita
C. Ronald Stephen, MD, Editor Emeritus
Doris K. Cope, MD, Editor Emerita

David B. Waisel, MD, Editor
Douglas R. Bacon, MD, Associate Editor

Assistant Editor
Book Review: Theodore Alston, MD
Deborah Bloomberg, Editorial Staff

Manuscripts, editorial correspondence, and other inquiries should be addressed to David B. Waisel, MD, Editor, Bulletin of Anesthesia History:

David B. Waisel, MD
Editor, Bulletin of Anesthesia History
Boston Children’s Hospital
300 Longwood Avenue – Bader 3
Boston, MA 02115
USA
Telephone: (617) 355-6457
Email: Bulletin@ahahq.org
Results
During this 10-year period, 30,600 articles were published in these journals (range, 2573 to 8563 articles). Of all articles published, only 382 (1.25%, range, 0.41% to 2.87%) were related to the history of anesthesia. The proportion of all articles related to history showed a significant difference with time (P<.001), primarily from differences in minor articles (P<.001). Analysis of the number of history-related articles published shows no obvious difference over the 10-year period (P=.25), but a significant difference among journals (P=.005). For major articles, there was a significant effect with time (P=.046) and journal (P<.001). Minor articles revealed no significant effect with time (P=.15), but significant differences among journals (P=.02).

Conclusions
Our analysis of 30,600 articles published in six mainstream journals devoted to anesthesiology found that considerable differences exist in the proportion and number of articles that were related to history of anesthesia.

Introduction
While meeting many obligations and respecting the constraints of space, editorial policies of medical journals inadvertently take on the role of determining what is important to know and what results merit publication. One type of publication bias occurs when researchers are less likely to submit, and journals less likely to publish, findings that are negative or inconclusive. Such bias also occurs when trials examining several outcomes selectively report only findings that are most relevant to or in agreement with existing knowledge. The exclusion of inconclusive and negative findings alters subsequent meta-analysis and results in incorrect conclusions and adoption of treatments based on only partial information. An unintended consequence of not publishing certain types of articles is a rechanneling of research and investigative effort towards activities that are more likely to result in publication.

A different type of publication bias occurs when material related to the history of a specialty is perceived not to be of interest to readers, especially since such information is unlikely to change clinical practice or bring about a new understanding of physiologic or pharmacologic processes. Data on the level of interest in history among the lay population, or physicians in particular, are sparse. Approximately 2% of college undergraduates in United States select history as their major, although the vast majority of them subsequently embark on careers unrelated to history.1,2 A recently survey about the careers of anesthesia historians found that a significant proportion of respondents expressed concern about difficulty in getting their work published in peer-reviewed journals.3

We examined publication rates for articles related to the history of anesthesia to assess for the existence of publication bias against history-related articles. We also wished to determine whether differences existed in the nature of article published – major article (original article, special article, review article, etc.) versus minor article (commentary, brief communication, book review, etc.).

Methods
All articles published from January 2001 through December 2010 for the following journals were included: Anaesthesia, Anaesthesia and Intensive Care, Anaesthesia & Analgesia, Anesthesiology, British Journal of Anaesthesia, and Canadian Journal of Anesthesiology. Although some of these journals have been publishing articles since the first half of the last century, we decided to limit our investigation to the first decade after the onset of the new millennium.

Electronic versions of the articles were obtained either through the websites maintained by the journals or through online access available to academic institutions and libraries. The contents of each article were examined to determine whether it was related to history. Articles were categorized according to type of article (original article, review article, book review, etc.). Usually this was done by the publisher, but we would assign an appropriate category when no such category was assigned by the publisher. We further categorized the type of article as either a major article or a minor article. Factors that affected our decision about categorization included length of article, originality of the contribution, and whether the article was written at the invitation of the publisher. Major articles were those typically classified by publishers as original ar-

<table>
<thead>
<tr>
<th>Year</th>
<th>History Articles No. (% of total number of published history articles)</th>
<th>Non-history Articles No. (% of total non-history articles)</th>
<th>Total Articles No. (% of total number of published articles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>31 (0.10)</td>
<td>3178 (10.39)</td>
<td>3209 (10.49)</td>
</tr>
<tr>
<td>2002</td>
<td>32 (0.10)</td>
<td>3294 (10.76)</td>
<td>3326 (10.87)</td>
</tr>
<tr>
<td>2003</td>
<td>47 (0.15)</td>
<td>3325 (10.87)</td>
<td>3372 (11.02)</td>
</tr>
<tr>
<td>2004</td>
<td>25 (0.08)</td>
<td>3157 (10.32)</td>
<td>3182 (10.40)</td>
</tr>
<tr>
<td>2005</td>
<td>27 (0.09)</td>
<td>2896 (9.46)</td>
<td>2923 (9.55)</td>
</tr>
<tr>
<td>2006</td>
<td>31 (0.10)</td>
<td>3086 (10.08)</td>
<td>3117 (10.19)</td>
</tr>
<tr>
<td>2007</td>
<td>21 (0.07)</td>
<td>3061 (10.00)</td>
<td>3082 (10.07)</td>
</tr>
<tr>
<td>2008</td>
<td>32 (0.10)</td>
<td>2753 (9.00)</td>
<td>2785 (9.10)</td>
</tr>
<tr>
<td>2009</td>
<td>65 (0.21)</td>
<td>2793 (9.13)</td>
<td>2858 (9.34)</td>
</tr>
<tr>
<td>2010</td>
<td>71 (0.23)</td>
<td>2675 (8.74)</td>
<td>2746 (8.97)</td>
</tr>
<tr>
<td>2010</td>
<td>71 (0.23)</td>
<td>2675 (8.74)</td>
<td>2746 (8.97)</td>
</tr>
<tr>
<td>Total</td>
<td>383 (100)</td>
<td>30218 (100)</td>
<td>30600 (100)</td>
</tr>
</tbody>
</table>
Trends... Continued from Page 3

cicles, special articles and review articles. Minor articles were broadly defined as submissions that were requested, such as editorials, book and media reviews, and brief notes, or submissions that did not undergo extensive peer review, such as correspondence. The journals’ published editorial policies about the nature of submissions were examined noting comments about the submission of articles related to history of anesthesia.

Raw data were compiled manually and subjected to quantitative analysis by a professional statistician using SAS v9.3 software (SAS Institute Inc., Cary, North Carolina). Comparisons of proportions were made using the Chi-square or exact test (when expected frequency was small). The effects of publication over time were analyzed using linear regression, while comparisons between journals were analyzed using analysis of covariance. The level of significance was set at .05.

Results

Examination of author’s guidelines for the journals did not disclose any specific mention encouraging or discouraging submissions related to history of anesthesia. The absence of such a finding diminishes the possibility of the existence of an a priori bias towards acceptance or rejection of such submissions. During the years 2001 through 2010 inclusive, the six journals published a difference with time (P<.001) with an increase in the last two years, 2009 and 2010. This change was due to an increase in the number of minor articles published (P<.001), while the number of major articles published did not change over the years [P=.89].

Linear regression analyses were combined with analysis of covariance to detect the effects of journal and time. Regression analysis of total number of articles published (major plus minor) in each of the six journals (each journal considered separately) showed no obvious effect of time (P=.25), but there was a significant difference between journals (P=.005). Analysis of covariance shows that there does not appear to be any major differences over the years since the regression lines are essentially flat (Figure 1). A small positive slope suggests a slight increase with time. Anesthesiology published more articles than the other journals, especially during 2009 and 2010. Gaps between the lines for each journal suggest a difference between

<table>
<thead>
<tr>
<th>Journal</th>
<th>History articles</th>
<th>Non-history articles</th>
<th>Total articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anesthesiology</td>
<td>166 (2.87)</td>
<td>5617 (97.13)</td>
<td>5783 (100)</td>
</tr>
<tr>
<td>Anaesthesia and Intensive Care</td>
<td>85 (2.37)</td>
<td>3498 (97.63)</td>
<td>3583 (100)</td>
</tr>
<tr>
<td>Anaesthesia</td>
<td>56 (1.08)</td>
<td>5150 (98.92)</td>
<td>5206 (100)</td>
</tr>
<tr>
<td>Anesthesia &amp; Analgesia</td>
<td>35 (0.41)</td>
<td>8528 (99.59)</td>
<td>8563 (100)</td>
</tr>
<tr>
<td>British Journal of Anaesthesia</td>
<td>23 (0.47)</td>
<td>4869 (99.53)</td>
<td>4892 (100)</td>
</tr>
<tr>
<td>Canadian Journal of Anesthesia</td>
<td>17 (0.66)</td>
<td>2556 (99.34)</td>
<td>2573 (100)</td>
</tr>
<tr>
<td>Total</td>
<td>382 (1.25)</td>
<td>30218 (98.75)</td>
<td>30600 (100)</td>
</tr>
</tbody>
</table>

Fig. 1. Linear regression and analysis of covariance for ALL articles related to history.

Table 2. Total number of published history and non-history articles by journal

Continued on Page 5
Trends... Continued from Page 4

publication rates among the journals. When only major articles were considered, there was a significant effect both of time (P=.046) and journal (P<.001) (Figure 2). When only minor articles were considered, there was no significant effect due to time (P=.15), but there was a significant difference between journals (P= .02) (Figure 3). Pairwise comparisons between two journals for the number (total, major, minor) of articles were made with the use of a 95% confidence interval (CI) with Bonferroni correction (P<.009) to adjust for the possibility that in multiple comparisons the null hypothesis may be rejected by chance.

Analysis by journal, of total number of articles published (major plus minor) showed that Anesthesiology published more articles than Anesthesia & Analgesia, Canadian Journal of Anesthesia, British Journal of Anaesthesia, or Anaesthesia and Intensive Care (P<.05). Anaesthesia also published more major articles than either British Journal of Anaesthesia or Anaesthesia and Intensive Care (P<.05). There was no significant difference among the journals for minor articles. Table 3 lists the most frequent types of articles that each of the journals published.

Discussion

Lack of opportunities to publish their findings in peer-reviewed journals has been cited by anesthesia historians as a significant impediment in their careers. Several studies have confirmed the existence of publication bias in medical journals and offered suggestions for improvement. When the same consensus statement is published in multiple journals, the prominence of the journal in which an article is published, measured by its impact factor, influences the number of citations that the article will gather over time. In an interesting test for bias, two versions of a mock randomized control trial with identical raw data were submitted to different journals for review. One version suggested a positive outcome, while another suggested no difference. The authors found that reviewers were more likely to recommend the positive version of the test manuscript for publication than the no-difference version (97.3% vs. 80.0%, P<.001). Recently published studies have both confirmed and refuted the existence of publication bias.

Our study of articles published in six journals over a ten-year period suggests that history-related articles, especially major articles, are published infrequently (1.25% of all published articles). In addition, our results suggest that some journals are more likely than others to publish articles related to history. None of the guidelines given to authors for all these journals specify whether they encourage or discourage publication of materials related to history, but our results suggest that marked differences exist in the total number and type of article published by these journals. A limitation of this study is that information about the number of history manuscripts and of all manuscripts submitted to these journals is not published. Thus, our results and conclusions are based on what has been published, not what was submitted for editorial review.

The Australian publication Anaesthesia and Intensive Care deserves special mention for two reasons. First, every issue since 1986 carries a brief article devoted to history under the category “Cover Notes.” Second, in each year since 2005, the journal has published a supplementary issue devoted entirely to history. Although we consider it beneficial that each issue publishes a history article and that history articles are occasionally published in the main issues, segregating history-related articles into a supplementary edition of the journal may
increase the likelihood that they are omitted from the main issues. It is our opinion that such articles should be considered mainstream and published alongside those in the main section of any journal devoted to our specialty.

In summary, we report that publication of history-related articles remains low, although this rate is increasing. Our study also suggests that some journals are more likely than others to publish articles related to history. Compared to the other journals, Anesthesiology has published more articles related to anesthesia history, in part due to a dramatic increase in minor articles during 2009 and 2010. Lastly, we acknowledge the importance given to history by Anaesthesia and Intensive Care, which starts each issue with an article related to history.

References
15. Liebeskind DS, Kidwell CS, Sayre JW,
Effect of the Daguerreotype Process on Morton’s Part in History
Theodore A. Alston, MD, PhD
Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts

Abstract
Because daguerreotype photographs are usually reversed laterally from actuality, images of W.T.G. Morton falsely suggest that he sometimes changed the side of the part in his hair. Because of daguerreotype image reversal, a statue of Apollo in the Ether Dome at the Massachusetts General Hospital appears to have been moved for the 50th anniversary of Ether Day.

Ether anesthesia was announced in the Boston Medical and Surgical Journal in 1846.1,2 The fiftieth anniversary of the event was celebrated in the same journal.3 Two images of William Thomas Green Morton in the 1896 issue are discrepant.1 As copied in Figure 1, Morton is first shown with his hair parted on the right side of his head. In the next image, his hair is shown parted on the opposite side. An image of someone of Morton’s importance should be remembered as accurately as possible, and the first image is inverted from right to left.

The explanation for the inversion is straightforward.4 The reversed Morton is copied from a daguerreotype photograph. Patented by Louis Daguerre in 1839, those photographs were usually inverted laterally (unless the apparatus included a mirror). In the daguerreotype process, an image is focused onto a film of metallic silver, the surface of which had been rendered light sensitive by reaction with iodine vapor. Exposure to light converts the silver iodide coating to relatively dark silver granules. Accordingly, the photograph is first a negative one (with bright areas shown as black). The negative is converted into a positive image in two chemical steps. First, elemental mercury vapor dissolves into (amalgamates with) the silver granules, rendering them bright. Second, the remaining silver iodide is darkened with “hypo,” sodium hyposulfite. After the so-developed silver film is righted from top to bottom, the image appears as if the observer were looking at the subject with the aid of a silver mirror.

The 1896 commemoration also includes an 1896 photograph of the Ether Dome, the operating theater in which anesthesia history was made (Figure 2). The room of the 1896 image is said to have been restored to appear as it did in 1846. The room of the 1896 image is said to have been restored to appear as it did in 1846. However, the photograph is laterally reversed. In reality, Apollo, still guarding the Ether Dome today, stands with right foot forward. The stance appears reversed in the 1847 daguerreotype. A quiver of arrows should be just lateral to the right leg. There is no quiver near the apparent right leg of the statue. In the daguerreotype, Morton’s waistcoat seems to incorrectly button right-over-left.

Those clues to lateral reversal are subtle, and Apollo was probably moved for the photograph of 1896, which is not a reversed image. Apollo’s image of 1896, with quiver to his right and with left arm held out for the bow, appears as it does in reality. However, he is located on the wrong side of the stage. Since the photograph of 1896, Apollo has been repositioned to his original place in the historic room. Accordingly, he now faces away and points away from the nearest wall.

The 1847 daguerreotype is sometimes said to represent the Ether Day scene of October 16, 1846. Instead, the staged photograph may have been intended to commemorate the first capital (life-threatening)
operation aided by inhaled ether. This was a right above-the-knee amputation performed

by George Hayward on Alice Mohan with the permission of Warren for Morton to
direct the anesthetist. Morton provided inhaled anesthesia. At that event, on November 7, 1846, Morton publically
revealed that the active ingredient of his

drug patent medicine was diethyl ether.

However, if Warren intended to preserve
a likeness of November 7, he nonetheless
effected some displacements. Warren, not
Hayward, rests his hands upon the leg. The
anesthetizer is not Morton. The anesthetizer
in the photograph is probably Jonathan
Mason Warren, son of the chief of surgery.
J.M. Warren is not holding a glass Morton
inhaler. He holds a simple sponge, which
he had introduced as a less-cumbersome
alternative to Morton’s device. J.M. Warren
later credited himself with “the first successful
operation under ether which was done

in private practice.”

In the posed publicity shot of Figure 3,
Morton has been displaced by the Warrens.
In one sense or another, the “parts” of many

figures from the mid-nineteenth century
may need to be re-examined.

References
1. Bigelow HJ. Insensibility during surgical
operations induced by inhalation. Boston Med Surg
2. Warren JC. Inhalation of ethereal vapor for the
prevention of pain in surgical operations. Boston Med
3. Davis KE, Ashhurst J Jr, Cheever DW, Reynolds
JP, McBurney C, Mitchell SW. Semi-centennial of
4. Haridas RP. Photographs of early ether
anesthesia in Boston: the Daguerreotypes of Albert
5. Warren JC. Etherization; with Surgical Remarks.
6. Warren JM. Surgical Observations, with Cases
From Bench to Bedside: Claude Bernard, Henry K. Beecher, MD, and Science in Anesthesia

Matthew L. Edwards, AB
Medical Student, University of Texas Medical Branch at Galveston, Galveston, Texas

Disclosure
The 2009 Paul M. Wood Fellowship program at the Wood Library-Museum of Anesthesiology funded this research.

Manuscript Versions Presented at CME Meetings
The 17th Annual Spring Meeting of the Anesthesia History Association and UT Southwestern Medical Center, April 29, 2011, Grapevine, TX.
The 18th Annual Spring Meeting of the Anesthesia History Association and Kansas University Medical Center, May 4, 2012, Kansas City, KS.

Abstract
Success with the medical management of pain grew tremendously after William Thomas Green Morton's successful demonstration of surgical anesthesia in 1846. Henry K. Beecher's clinical and experimental contributions to anesthesia during and after World War II had a profound impact on how clinicians and experimentalists study human populations in medicine. Beecher found that pain research required human subjects because pain was different for each individual. Nearly 100 years before Beecher, Claude Bernard similarly considered the complexity and uniqueness of human research subjects. Bernard and Beecher both preferred animal subjects in research when appropriate, but suggested that studies involving some mental, bodily, and cognitive processes required human subjects. Although Beecher and Bernard's lives did not overlap, these two men similarly confronted the issues of complexity in human and animal research, particularly in those phenomena involving higher cognitive functions.

Introduction
Anesthesia's clinical importance was widely recognized after William Thomas Green Morton's successful demonstration of surgical anesthesia with ether in 1846.5 Nearly a century passed, however, before anesthesia gained the scientific basis needed for its development as a medical specialty.6 Dr. Henry K. Beecher's [1904-1976] clinical and experimental contributions during the decades following World War II helped anesthesia develop an enduring scientific foundation. Although Beecher's work spanned experimental physiology, pharmacology, and medical ethics, he is perhaps best known among physicians for his landmark study of differences in narcotic requirements between soldiers and civilians.

Beecher's study of pain among soldiers and civilians was important for several reasons. He found that the response to pain and suffering in humans varied across individuals and depended on an individual's biological, psychological, cognitive, and social environment.3 This finding led Beecher to conclude that human subjects were necessary for experiments in medicine, especially "when the desired ends cannot be obtained in other ways, as through experimentation in animals."4 Yet Beecher was not the first physician-scientist to consider the challenge of human and animal subjects in research. Nearly 100 years before, French experimental physiologist Claude Bernard [1813-1878] similarly considered the significance of living organisms for research and was one of the first scientists to advocate scientific method in biology. Bernard and Beecher both urged the use of animals in research when appropriate, yet understood that studies involving complex cognitive processes required human subjects. Their shared interests in physiology and anesthesia led to similar, historically significant views on human and animal subjects in medical research.

Claude Bernard and Experimental Research
Bernard conducted a number of basic research studies in anesthesia as early as 1855.3 He found that morphine administered before anesthesia reduced the amount of inhalation anesthesia needed. Bernard was also the first scientist to study curare and suggest its usefulness in neuromuscular blockade.6 More importantly, Bernard's curare studies changed the direction of contemporary medical thought on the actions of drugs. At the time, physicians and experimentalists believed that drugs exerted a general influence on an individual. Bernard's curare studies, however, found that drugs operated at "strictly localized and well-defined sites" of action.5

Claude Bernard is often credited as the "father of experimental physiology" because of his work in establishing physiology as a science.4 Bernard's interest in physiology began early in his career when he studied the physiologic effects of curare, its mechanism of action, and its effects on the nervous system under the famous physiologist Francois Magendie.2 Bernard's seminal publication in 1865, An Introduction to the Study of Experimental Medicine,10 laid the framework for a laboratory-based medical science at a time when medical knowledge was dominated by clinical observation.4

Although Bernard endorsed an experimental method for biological research, a majority of his contemporaries did not.3 These scientists believed that organisms possessed "vital forces" that acted independently of their physical and chemical properties.9,10 This notion of "vitalism" was at direct odds with the principle of determinism, which Bernard actively sought to promote in experimental medicine. In biological science, determinism refers to "a theory for which natural, psychological, and social phenomena are causally determined by preceding events or natural laws."11 Bernard understood that although outside factors affect outcomes in research, medical science could nonetheless predict and influence the behavior of organisms by understanding their initial conditions and the laws that govern them.10

The lynchpin of Bernard's Introduction is the experimental physiology illustrated by concepts from his own research.8,9,10 His concept of the milieu intérieur (i.e., internal environment or homeostasis) held that organisms could regulate their bodies to maintain internal stability despite variations in external conditions.8,10 In discovering the glycogenic function of the liver, Bernard reasoned that organisms could respond with indifference to their environment. This principle was not only important for endocrine regulation, but also for experimental research. Indifference to the external environment suggested that "invariable conditions" (or controlled environments) were inherently more difficult in studies of higher organisms.8,10 Thus, for Bernard,
Bernard's prejudice for qualitative experimentation was rooted in his quest for physiological principles, not merely basic description and measurement of observations. For Bernard, scientific determinism meant that animal physiology studies were entirely applicable to humans. He argued that the use of statistics was insufficient for establishing a science because it did not account for non-quantifiable differences among individuals. This skepticism of statistics was not at all uncommon of 19th century science; it took several decades after Bernard's death for statistics, or "mathematical medicine" as it was known, to gain enough sophistication to properly address data aggregated from multiple individuals in research.

As an experimentalist, Bernard preferred case studies involving individual circumstances "rooted in rigorous, experimentally derived, and deterministic phenomena." Scholars have generally agreed that Bernard believed that physicians needed certainty about whether a patient's health would progress—certainty that could only be afforded through absolute laws, which required scientific determinism. According to Bernard, statistics could be useful in studying the efficacy of medical treatment (e.g., pain relief) but would likely mislead experimental physiology. Ultimately, Bernard viewed statistics as unnecessary when physicians and scientists understood the mechanisms and underpinnings of disease and pathology.

Bernard believed that medical research required living beings, but recommended studying animal subjects before human subjects. Although he reasoned that all animals could be used for scientific investigation because the same principles and laws governed all living species, he conceded that experiments with human subjects would be most applicable to humans. More importantly, Bernard stated that "from a physiological point of view, experimental study of sense organs and cerebral functions must be made on man, on the one hand, because man is higher than the animals by faculties which animals lack." Thus, Bernard understood that the study of cognitive phenomena in man required human subjects to understand behavior.

**Henry K. Beecher and the Reaction Component to Pain**

Despite Bernard and Beecher's shared interests in physiology and anesthesia, Beecher and Bernard are rarely compared, perhaps because their lives did not overlap. Like Bernard, Beecher understood the importance of clinical observation and experimentation and realized the challenges that living organisms pose for experimental research. Beecher went on to develop experimental approaches that addressed these issues by enabling each individual to serve as his or her own control, allowing for more scientific determinism.

Beecher made important contributions to anesthesia by establishing the principles and practices for measurement of subjective responses (1952), the average pain index (1953), and the refinement of the controlled clinical trial of analgesics using crossover random controlled trials (1956). Beecher conducted research with Nobel laureate August Krogh in Copenhagen before taking his post at Massachusetts General Hospital under the auspices of Dr. Edward Churchil. Beecher's intellectual lineage can be traced back indirectly to Bernard through Krogh. Bernard trained Peter Ludvig Panum, who trained scientist Christian Bohr, who trained Krogh. Beecher felt that basic science was essential for anesthesiology because he believed that the irritability or response of a living cell to a stimulus was the most fundamental motif in living organisms. A cell's irritability held the key to many important concepts because it was the response to a stimulus—the most elemental form of consciousness.

Beecher observed the inadequate treatment of pain in postoperative patients firsthand while serving in the military as a medical consultant. Soldiers wounded in battle seemed to require less morphine for sufficient analgesia than civilian patients at the Massachusetts General Hospital. Beecher hypothesized that the reaction component contributed to these different reactions to pain. The reaction component was an individual's psychological, emotional, and social experiences that caused pain to be perceived differently across individuals. In this case, soldiers were returning home to safe comforts (e.g., honorable discharge, community recognition, etc.) while their civilian counterparts moved into a clinical environment much different from their community.

For Beecher, the reaction component explained why individuals respond differently to similar injury and illness, and why the soldier's experiences in World War II differed so markedly from their civilian counterparts. The subjective component of pain was not a new concept to behavioral science. In fact, Beecher's work grew out of earlier work by Strong and Marshall that dated back to 1895. Psychophysics, the predominant method for measuring pain during the 1950s, built on the idea of a direct relationship between perceived intensity of a stimulus and the experience of pain. For Beecher, psychophysics was sufficient for experimentation in animals, but not in humans. Beecher's explanation was that the reaction component was sensitive to an individual's environment, and that pain reproduced in the laboratory differed markedly from pain of pathological origin.

The Hardy-Wolff-Goodell (HWG) method was the most widely accepted experimental method in psychophysics. This method utilized radiant heat from high wattage heat lamps applied directly to the skin. The basis of the method was that subjective pain could be easily defined in quantitative terms such as duration, magnitude, intensity and relief, enabling experimentalists to measure the differential effects of various analgesics. While this approach seemed reasonable in theory, it was difficult to replicate in practice. Beecher took issue with this lack of reproducibility and argued that the group's subjects became sensitized to the pain, and merely responded accordingly. The confluence of the subjects' expectations and the HWG group's design, rather than the phenomena involved, contributed to the remarkable fit of HWG group data. Beecher argued that the HWG group data not only failed to address the reaction component, but also provided proof of the reaction component.

Clinical pain assessments must seriously consider the cognitive and affective responses to perception and cognition. Pain was "different for each individual" and was a product of variable factors including past experience, age, sex, ethnicity, and anxiety.

Beecher insisted that subjective reactions to pain could be accounted for in research. He identified patients with variable diagnoses and opioid need and ensured equal likelihood that patients received each manipulation by using dual drug designs with a standard of reference and a placebo. Beecher's clinical trials were designed so that each patient would serve both as his "own control" and as a comparison against the "same order of pain." This double blind randomized crossover design became the standard practice for drug evaluation.
and shaped the scope and design of experimental drug evaluation.18,20,21

Beecher understood that the reaction component in humans was variable and unique to each individual. Like Bernard, he agreed that experimentation done in man should be carried out in animals if possible, stating “medical research, therefore, is dependent upon experiments on man which deliberately alter bodily and mental functions.”4 Bernard insisted that higher cognitive functions were particular to higher organisms, and Beecher’s understanding of pain included complex biological, cognitive, and affective components. Beecher’s insistence that research into the effects of pain and cognitive processes on the reaction component were better suited in man than in the laboratory was shaped by Bernard’s legacy of experimentation in living organisms.

Discussion

Bernard and Beecher shared a number of similar views and interests, including clinical interests in pharmacology, physiology and anesthesia. Their thoughtful nature and desire for basic scientific discovery led them to strive for a thorough understanding of basic mechanisms and functions in their research. Experimental methodology in biology was relatively recent development during Bernard’s lifetime and was still not deeply ingrained in anesthesia during some of Beecher’s. Although both men were motivated principally by different goals and aims (i.e., science vs. medicine) and with research and ideas separated by nearly a century, their quest for scientific advancement in biology led them to similar views on the nature of human and animal subjects in research.

Bernard saw the complexity of higher organisms in the context of homeostasis and cognition; Beecher saw evidence for complexity in the cognitive processing of the reaction component. For Bernard, the uniqueness of organisms was based on their complexity (e.g., regulation and homeostasis) rather than a “vital” force. Nearly a century later, Beecher devised experimental methods to “control” for variable factors across individuals. In short, Beecher and Bernard confronted the same issues of complexity in animal research, particularly in those phenomena involving higher cognitive functions. The sophistication of Beecher’s research designs allowed anesthesiaiology to gain basic knowledge about cognitive and mental processes across variable human experiences. Together, Claude Bernard and Henry Beecher’s research and writings remain a testament of the importance of the advancement of basic science in medical research and the practice of anesthesia.

Acknowledgements

Paul M. Wood Fellowship Program at the Wood Library-Museum of Anesthesiology, Park Ridge, IL.

The following individuals provided invaluable support: Donald Caton, MD, Professor Emeritus of Anesthesiology and 2004-2008 Laureate of Anesthesia History, University of Florida College of Medicine, Gainesville, FL; George S. Bause, MD, MPH, Clinical Associate Professor of Anesthesiology and Perioperative Medicine, Case Western Reserve University, Cleveland, OH; Charles Tandy, MD, Clinical Assistant Professor of Anesthesiology, UT Southwestern Medical Center, Dallas, TX; Patrick Sim, MLS, Paul M. Wood Librarian Emeritus, Wood Library-Museum of Anesthesiology, Park Ridge, IL (deceased).

References

Medical History for Anesthesiologists: Continuation of a Primer

Manisha S. Desai, MD* and Sukumar P. Desai, MD**

*Clinical Associate Professor of Anesthesiology, University of Massachusetts Medical School, Worcester, Massachusetts; **Assistant Professor of Anesthesiology, Harvard Medical School, Anesthesiologist, Brigham and Women’s Hospital, Boston, Massachusetts

Editor’s note: The absence of a recognized formal curriculum in anesthesia history means that many of us have known and unknown gaps in our knowledge. These gaps limit our ability to understand how things came to be, how things may become and how we can affect the future. I have asked Dr. Manisha Desai and Dr. Sukumar Desai to provide a primer on the history of medicine and anesthesia history. The goals of this primer are to educate and to help individuals target future study. Below is the second article in a continuing series.

History of Science:

Continuing with advances in the Classical Era, Aristotle [384-322 BCE] emphasized observation of the natural world and used scientific principles to explain natural phenomena such as motion, movements of celestial bodies, and properties of matter. In addition, he held a keen interest in biology. Similar to Plato’s Academy, Aristotle founded a school in Athens called the Lyceum. His students and followers include Theophrastus, Strato, and Alexander III of Macedon (Alexander the Great).

Alexander III of Macedon founded Alexandria in Egypt. Alexandria became a great academic center and housed a magnificent library and museum. The mathematician Euclid, known for his contributions in geometry, worked in Alexandria. Archimedes [287-212 BCE] studied in Alexandria, but spent most of his career in Syracuse, Greece. His contributions included determination of the density of solids, geometrical properties of spheres and cylinders, applications of mechanical leverage, and the use of many large mirrors to concentrate the heat of the sun to set invading ships ablaze. Subsequent Greek contributions added greatly to our knowledge of celestial motion. The Romans conquered Greek territories by the end of the 1st century BCE, and their scientific contributions was dominated by practical applications of the principles elucidated by the Greeks. These included roadways, architecture, aqueducts, water-mills, heating and plumbing. The Romans improved upon earlier calendars and established the Julian system in honor of Julius Caesar in the 1st century BCE. They also introduced formal educura curricula with emphasis on the seven liberal arts—rhetoric, grammar, dialectic [these three constituting the trivium], arithmetic, geometry, astronomy, and music [the four constituting the quadrivium]. These liberal arts were believed to be more suitable for aristocrats, while medicine and architecture were considered technical applications more appropriately classified as crafts and trades. The Roman Empire lasted half a millennium and ended with the fall of Rome in 476 CE. This period is marked by the rise of Christianity and the spread of existing knowledge throughout southern Europe, North Africa, and Western Asia. During this period, Greek works were translated into Latin, Arabic, Hebrew, and other languages.

History of Medicine:

Ancient medicine in Egypt and Greece was marked by a belief in supernatural causes of disease, a notion that was dispelled by Hippocrates and his followers. The next giant of ancient medicine was Galen [130-201 CE] (Figure 1), who was born in Bergama, which is in present day Turkey. He formalized the many practices that had emerged after Hippocrates’ death in 350 BCE. Achieving a balance in the four body fluids (blood, yellow bile, black bile, and phlem) continued to be very important and physicians used a variety of methods to achieve such balance. Galen’s work included animal vivisection and experimentation about physiological processes. He believed that an essential gaseous substance (pneuma) entered the body via the lungs, from where it went to the left ventricle and thence onto the brain. From the brain, psychic pneuma carried information to the rest of the body through nerves. Galen taught that food reached the liver from the stomach, and that blood was synthesized in the liver. He believed that veins carried blood to the tissues. For a brief period, he worked in the arena where gladiators fought and died. In this capacity, he was able to observe the beating human heart, pulsatile flow in arteries, movements of the chest and lungs, as well as peristaltic movements of the intestine. He showed that pulse was related to the heart beat, that arteries contained blood, that lungs expanded because of the negative pressure created by the diaphragm, that urine was formed in the kidney (not the bladder), and that voice originated in the larynx under the control of nerves. He used mixtures of plant extracts and chemicals, and for hundreds of years these mixtures were marketed as galenicals. His written works are summarized in 22 volumes, and his influence was so great that his doctrine remained unchallenged until the 16th and 17th centuries.

History of Anesthesia:

Among other techniques, alcohol, opium derivatives, cannabinoids, and belladonna derivatives were used to provide sedation, analgesia, and amnesia to perform surgical operations. These were in use until the 1840s when recreational use of nitrous oxide and ether gained popularity. It is unclear who deserves credit for the discovery of anesthesia, but we will briefly examine the roles played by key contributors and suggest one way to address this controversy.

Humphrey Davy [1778-1829] studied properties of various gases while working at The Pneumatic Institute, Bristol, UK, among them nitrous oxide. He verified its effects on the nervous system and suggested that these properties might be used to advantage during surgical operations. However, neither he nor his colleagues followed up on this suggestion. In January 1842, medical student William Edward Clarke [1819-1898] unknowingly became the first person to use ether during a dental extraction. His professor, E.M. Moore, dissuaded him from carrying out any further administrations, and neither Moore nor Clark’s biographers felt that Clarke had made a significant contribution. In 1842, Crawford Williamson Long [1815-1878]
was aware of the recreational use of ether, and on March 30, 1842, he was the first to use ether during a surgical operation. He regularly administered ether during surgical procedures in his medical practice in rural Georgia. He is faulted for not publicizing his findings and for waiting until 1847 before publishing his work. During the mid 1840s, it was common for itinerant showmen to stage nitrous oxide demonstrations for purposes of entertainment. On December 10, 1844, during one such demonstration by Gardner Quincy Colton [1814-1898] in Hartford, Connecticut, dentist Horace Wells [1815-1848] observed the analgesic properties of nitrous oxide on a participant who had been accidentally injured. Wells underwent a painless dental extraction the next morning while Colton administered nitrous oxide. Wells used nitrous oxide extensively in his dental practice, a fact that was known to William Thomas Green Morton [1819-1868]. Wells wished to demonstrate the efficacy of nitrous oxide in Boston in January 1845, but the administration was only partly successful because the medical student who volunteered to have his tooth extracted screamed. The student later admitted that he did not remember feeling any pain, but the damage was done. Wells was ridiculed as he left the amphitheater, and he sought credit for his contribution in Europe and in the US. However, his life was never the same, and in 1848 he committed suicide in a New York prison after being arrested for attacking women.

Morton was aware of the properties of nitrous oxide and ether and was persuaded by Charles Thomas Jackson [1805-1880] to use ether. Morton conducted several experiments on lower species, and finally used it successfully during tooth extraction on Ebenezer Hopkins Frost on September 30, 1846. Morton also convinced Henry Jacob Bigelow [1818-1890] and Jonathan Mason Warren [1811-1867], staff physicians at Massachusetts General Hospital, about the efficacy of his technique. He won approval from John Collins Warren [1778-1856], chief-surgeon and founder of Massachusetts General Hospital, to administer ether during a surgical procedure. This demonstration, on October 16, 1846, was successful, and that day is now celebrated as Ether Day. Morton tried to conceal the identity of the active ingredient (he called the anesthetic “letheon” in his attempt to patent his treatment). These attempts were unsuccessful, and a battle for the credit of discovering anesthesia raged in the popular press and congress for over two decades. The matter was never resolved legally, with Morton, Jackson, and Long being the main contenders.

We suggest the following resolution to the controversy over the discovery of anesthesia. The process is best broken down into components and credit distributed according to clearly defined roles played by the various participants. Humphry Davy deserves credit for first suggesting that nitrous oxide possessed analgesic properties. William Edward Clarke should be credited with the first use of ether for a dental procedure, whereas Crawford Williamson Long deserves credit for the first use of ether during general surgery. Horace Wells deserves credit for the first use of nitrous oxide during dental surgery. Charles Thomas Jackson deserves credit for suggesting to William Thomas Green Morton that ether might be used as an anesthetic. William Thomas Green Morton deserves credit for conducting experiments on ether, demonstrating its efficacy publicly, and for spreading word about its efficacy throughout the medical community. By abandoning attempts to give credit to one individual, we can truly recognize efforts that led to the discovery of anesthesia.

Coming up next: We shall discuss other advances made in science during the dark ages and the role of Vesalius and others in finally ending the strangulating influence of Galen’s beliefs. We then explore the evolution of early anesthesia beyond simple administration of ether or nitrous oxide.

Additional Reading:
An Interview with A.H. “Buddy” Giesecke Jr, MD

Amy P. Woods, MD and Babatunde Ogunnaike, MD*
*Assistant Professor, “Professor, University of Texas Southwestern Medical Center at Dallas Department of Anesthesiology and Pain Management, Dallas, Texas

This interview was conducted on May 18, 2011, at Dr. Giesecke’s home in Irving, TX. Dr. Giesecke died December 24, 2011.

A. H. “Buddy” Giesecke Jr, MD, is an important figure in the history of the Department of Anesthesiology and Pain Management at the University Southwestern Medical Center and at Parkland Memorial Hospital in Dallas (Figure 1). He studied anesthesia and later practiced there, where he worked closely with other renowned anesthesiologists, including M.T. “Pepper” Jenkins. Dr. Giesecke’s articles on endotracheal intubation in obstetrics and the interaction between succinylcholine and magnesium produced change in the practice of anesthesia. In his later years, he became interested in the history of anesthesia and was very active in the Anesthesia History Association. His passion for the specialty was evident in the way he spoke about anesthesia. Hear his words, and perhaps even his voice, in the interview below.

AW: Start by telling us a little bit about you, starting with your childhood.

AG: Well, I was born in Oklahoma City [in 1932], but we moved to Cotulla, Texas [when I was very young]. My father was a graduate of [Texas] A&M, and so he was in the Army reserve. In 1940, he was called to active duty and went to the Philippines. He was on the Bataan death march. He lived in a Japanese prison camp until February 1945 when he died of malnutrition and exposure and other things. So, then I grew up in San Antonio, which was close to my father’s family, and I went to the University of Texas at Austin, and the University of Texas Medical Branch at Galveston. It was in Galveston that I married Roni, after my freshman year (Figure 2). We have four children. After medical school, I did my internship at William Beaumont Army Hospital in El Paso. I went into the army because the pay was better, and we were extremely poor. I went through medical school on $200 a month.

AW: Who was your inspiration for pursuing a career in medicine?

AG: After my father died, my uncle [Dr. Carl Giesecke] assumed the responsibility for giving me some masculine influence in my life. He was in the Battle of the Bulge in Europe in World War II and was wounded there. He was the commanding officer of a hospital there and really spent the rest of his career in the army. He was a major influence in my becoming a doctor. He was a good doctor.

AW: Why did you decide to become an anesthesiologist?

AG: My goal when I graduated from medical school was to become a pediatrician. But I went in the army and became a flight surgeon. The commanding officer found out that I was interested in pediatrics, so he assigned me to the pediatric clinic to work whenever I wasn’t doing flight physicals and official aviation medicine duties. I discovered that I really enjoyed working with the children — that was not a problem, but the parents just drove me crazy! So I decided that I wouldn’t become a pediatrician; I would do something else. I wanted to do something that involved the skills and knowledge that I acquired as an aviation medical officer… in other words, barometric pressure, gases, oxygen, breathing… anesthesia was a natural. I heard about the program at Parkland. I learned that it was a developing program under a very charismatic young chairman. I came and took a look and immediately fell in love with Dr. [M.T. “Pepper”] Jenkins and with the department. The rest is history.

AW: What are your areas of interest in anesthesia, and how did they come about?

AG: My most productive academic innovations have been in obstetrical anesthesia. That’s my primary interests, but I have to tell you that I love the whole field.

BO: You just mentioned that your most interesting innovations were in obstetrics. Can you tell us about them?

AG: When I was a resident, I was doing anesthesia for a c-section with cyclopropane under the mask, which was the routine in those days. The patient was about 18 years old and had two children already. She regurgitated, aspirated, and died. I felt that was such a needless death, and I needed to do something to improve the mortality of obstetrical anesthesia. The natural thing, of course, is regional anesthesia, and we started doing a lot of that, but not everybody is a candidate for regional anesthesia. So I promoted the idea of endotracheal intubation for operative obstetrics where general anesthesia is required. That gradually took hold and became the standard of care in Dallas and then in Texas in general. The second one was when I was working with [Dr. Richard] “Dick” Morris, who observed that the women who were pre-eclamptic were requiring smaller doses of succinylcholine. In those days, we were maintaining muscle relaxation with a succinylcholine infusion. I agreed that we should do a project, where we carefully weighed the women and then measured the dose of succinylcholine on the basis of their body weight, and sure enough, the women who were pre-eclamptic who were taking magnesium required half

Continued on Page 15
of the dose of succinylcholine that normal women did. We figured that there was some interaction going on between magnesium and succinylcholine. It turned out that the interaction is present with all the muscle relaxants. That was an original observation, and I think that it changed the way people practiced medicine because they started being careful with the doses of neuromuscular blocking drugs in pre-eclamptic patients. We also became aware that you could reverse the effects of the interaction with calcium.

AW: Going back to your training, what was it like to be an anesthesia resident in the 1960s?

AG: Oh, it was something. It was hard work, long days, long hours, call every other night, no day off after call. You just worked all day and when you got through, you went home totally exhausted. It was hard, but there was a lot of learning in that because there was a lot of patient exposure. We learned something in the conferences, but we learned from our patients primarily.

AW: What are the most significant changes in our profession since your residency?

AG: There are really five or six landmarks, I call them “eras,” in anesthesia practice. One was the introduction of inhalation anesthesia in 1846. The other was the introduction of regional anesthesia in 1894. Then there was intravenous anesthesia in 1932. Then there was fluid therapy in the operating room, which Dr. Jenkins introduced in 1950. And then there was the introduction of “precision anesthesia,” I call it. That means we can precisely measure the amount of anesthetic drug we were giving, and we also had precision monitoring equipment for pulse oximetry and pulse counting, and blood pressure. I believe that precision anesthesia and good monitoring are the major innovations in my career.

AW: The 1960s were an important time politically for the ASA. What do you remember about the development of the Relative Value Guide and other policies during this time?

AG: Largely, the Relative Value Guide came about because of pressure from Medicare and pressure from the insurance companies. They approached the American Society of Anesthesiologists to construct a fee schedule, and the ASA came up with a point scale for anesthesia services depending on your location in the country and the complexity of things. The insurance companies [and Medicare] loved it, but the Justice department said that doctors were collaborating to fix their fees. They issued a “cease and desist” order to stop the use of the Relative Value Guide, [and] the ASA sued them. That took a lot of courage for an organization that was young and did not have a lot of money, but they won! So the Justice department had to back down, and the RVG then became a sort of a standard fixture in all specialties of medicine. The ASA was the leader in that and then adopted a leadership position in organized medicine in the United States. It greatly enhanced our prestige among our colleague in medicine.

AW: Tell us about being at Parkland on November 22, 1963.

AG: That was, of course, the day that John F. Kennedy was assassinated. I had been doing cases all morning, and I went to the dining room at lunchtime with Dr. Jenkins. The call came over the loudspeaker system—in those days we didn’t have the little beepers, we had to depend on the loud speaker system of the hospital in order to get information. The call came, “Dr. Shires to the Emergency Room STAT.” That was a very bizarre call. Dr. [G. Thomas “Tom”] Shires was the Chairman of Surgery of Southwestern Medical School.

AW: Onto a different topic, you were a Fulbright Guest Professor of Anesthesiology in Mainz, Germany, in 1970-71. What did you do during your year abroad?

AG: Well, I guess I had become kind of restless here at Parkland, so I wanted to take some time off. I applied for a Fulbright Award and won it and went to Mainz, Germany. Mainz was an ideal location for a lot of reasons: one, they had an American school, and I could send my kids [who] wouldn’t when the President was declared dead, and I didn’t really have a chance to examine him. I knew that he was mortally injured because…in those days you had to use needles for the electrodes [for the EKG], and when I put the needles in under the skin, there was no response—no flinching, no withdrawal at all. That was a weird sensation. Good doctors are focused on the problem and not on the person necessarily, and it was only after the events were all over later on that day that we gathered in Dr. Jenkins’ office for a cup of coffee and to relax a little bit. We thought, “My God, what’s happened here today is really important, and we better everybody write it down.” So we did, we wrote down as complete as we could remember a recitation of the events of the day, and those appeared in Texas Medicine in January 1964 in an article called “Three Patients at Parkland.” You should get it and read it if you have any interest in the subject. Oliver Stone made a movie, a $12 million movie, called JFK, in which he presented the leading conspiracy theory by Jim Garrison, who was the District Attorney of New Orleans. Dr. Jenkins was hired by Mr. Stone as a consultant to the movie and was responsible for reconstructing trauma room 1 in there. Trauma room 1 had long been closed and remodeled and [was] gone by that time in 1992. Dr. Jenkins didn’t necessarily believe in the conspiracy theory, and in fact, he said, “The movie is a great movie, but it’s not a documentary.” [Dr. Jenkins] appeared in the emergency room scene; he played himself.

AW: What are your thoughts regarding Kennedy conspiracy theories?

AG: Oh, I think the conspiracy theories are bunk. I believe that there was one gunman. There were three shots fired—the first shot missed, the second shot hit the President in the back of the neck, and went through his neck, and then went through Governor Connally’s chest. The third shot was the fatal headshot, and the one that sealed the President’s doom.

AW: What are your thoughts regarding Kennedy conspiracy theories?

AG: Onto a different topic, you were a Fulbright Guest Professor of Anesthesiology in Mainz, Germany, in 1970-71. What did you do during your year abroad?
have to lose a year of their schooling. The second reason that Mainz was attractive was because the German Emergency Ambulance service, [the Nortartzwagen] was in the early stages of evolution. It’s like our EMS service, except a doctor rides in the ambulance. I spent a good portion of the year studying how the German emergency medicine system worked, and if it would work over here. The European system philosophy is to stay at the scene of the accident, and begin the resuscitation and do a major part of the resuscitation at the scene, and then take the patient to the hospital. Our technique is what we call “scoop and run”—we load the patient up on the ambulance after doing the best we can do to stabilize, and take them to the hospital and let the resuscitation be done in the hospital. When I got back and looked at what was developing in the United States, I decided our system was better.

AW: Tell us about your professional relationship and friendship with M.T. “Pepper” Jenkins.

AG: Pepper was a wonderful anesthesiologist, a wonderful doctor, and a wonderful leader. He was my mentor, my professional father, and even after I had been Chairman for 11 years, I continued to learn from him, really until he died. He of course was widely, widely recognized for his talents and his abilities. He was president of the Texas Society of Anesthesiologists; he was president of the American Society of Anesthesiologists. He won the Distinguished Service Award for both of those organizations, and he won the Distinguished Service Award from the American Medical Association. At the time he won it, he was the only anesthesiologist in history ever to win that award. Since then, another anesthesiologist, Dr. [James E] “Jim” Arens, also a Texan, has won that award. It’s a very prestigious award.

AW: What was the best advice he ever gave you?

AG: I think the best advice he ever gave me was to put the patient first. Second, you teach the medical students and the residents the very best way that you possibly can, demanding the highest level of excellence that you can demand. Last, you do research with whatever energy and resources are left after you’ve accomplished the first two.

AW: On that note, you have written over 100 publications, including articles, letters to the editor, textbook chapters, and book reviews. Which publications stand out in your mind the most and why?

AG: My criteria for excellence is ‘Did it really change the way people practice in a such a way that they never went back to the previous way?’ And the articles about endotracheal intubation [in obstetrics] and [the interaction between] magnesium and muscle relaxants did that.

AW: What do you think is the most important contribution UT Southwestern and Parkland Hospital have made to the field of anesthesia?

AG: Oh, without a doubt, the introduction of salt solutions in the care of the surgical patient by Dr. Jenkins [and his surgical colleagues] in 1950 is the most significant in my mind. You know, we have a lot of very important medical discoveries and innovations throughout the faculty of Southwestern Medical School, and they’ve achieved high recognition. But I doubt if any of those innovations have saved lives like Ringer’s lactate has. Ringer’s lactate was truly a sea change in the way people survived surgery and trauma.

AW: In your presidential address to the Southern Society of Anesthesiologists in 1972, you talked about your “most interesting patient.” Tell us about her and your other involvements with the Dallas Zoo.

AG: Dr. [Jack] Brundrett was the veterinarian at the Dallas Zoo, and he was good friends and neighbors with an anesthesiologist named [Dr.] Charlie Sloan. One day, he called and said that the gorilla [Jenny] was sick and the gorilla was very valuable, and would Dr. Sloan help? The first thing [Dr. Sloan] did was to call me because I had anesthetized all kinds of animals in the research process. So we gathered some equipment together, and went out. [Jenny] was vomiting, and she was dehydrated. They thought that she had an intestinal obstruction. They put her in a squeeze cage, where the bars of the cage came together from side to side, and they could compress her there so we could work with her and she wouldn’t be a danger to us. We started an IV on her and gave her some pentothal, and then we got her out of the cage after she’d had some pentothal and 9L of fluid (Figure 4). They did a laparotomy on her, [but] didn’t find a truly significant cause of intestinal obstruction. Seven months later, she delivered a baby gorilla in the cage. I think that her diagnosis of intestinal obstruction was really hyperemesis gravidarum! She recovered and lived another 40 years.

AW: You are an honorary member of the Japanese Society of Anesthesiologists. How did this relationship come about?

AG: Well, we used to have a system of visiting assistant professors; a few came from Japan, from the University of Hiroasaki. It was that friendship between our department and the University of Hiroasaki that caused me to be named or considered as an Honorary Member of the Japan Society. They provided airfare for my wife and me to visit Japan, and [they] provided an all-expenses paid tour of Japan, conducted by one of the residents. Japan is a beautiful country, and it has a very interesting history.

AW: You have received many honors and awards, including the Lifetime Achievement Award from International Trauma Anesthesia and Critical Care Society and the Texas Society of Anesthesiologists Distinguished Service Award. Of what honor are you most proud and why?

AG: Well, when I retired, I was appointed by the Board of Regents as an Emeritus Professor, and I think that is probably the most important one because that recognizes my interest and enthusiasm for teaching students and teaching residents. But I did have [another] one here just recently. Patrick Sim was the librarian of the Wood Library Museum of Anesthesiology in Chicago, and he died after 39 years as the librarian, and to speak as the first Patrick Sim Memorial lecturer, that was quite an honor (Figure 5).
AG: I think the rapid succession of introduction of new drugs is a thing of the past. I believe that the development of new machinery and new monitoring is our future for some time.

AW: What words of advice do you have for young anesthesiologists?

AG: I think anesthesia is a tremendous career. I’ve enjoyed every minute that I was in it. To those people who are in it now, who are becoming bored with it, I would say the solution is to study and to learn new things. There’s no reason that we should burn out because there’s enough new information to keep us stimulated.

AW: What do you want your legacy to be?

AG: I want to be remembered as an educator who demanded excellence without compromise. Teaching has been my love.

Sources and Suggested Reading
Giesecke AH. Anesthesiology at the University of Texas Southwestern Medical Center at Dallas: the First Fifty Years. Dallas, TX: Department of Anesthesiology and Pain Management at the University of Texas Southwestern Medical Center at Dallas; 2001.
William James Morton [1845–1920]:
Like Father, Like Son (?)

Antonio Aponte-Feliciano, MD*, Sukumar P. Desai, MD** and Manisha S. Desai, MD

‘Department of Anesthesiology, UMass Memorial Health Care, Worcester, Massachusetts; “Department of Anesthesiology, Perioperative and Pain Medicine, Brigham and Women’s Hospital, Harvard Medical School, Boston, Massachusetts

Disclosure
This work was supported by intramural funds.

Manuscript Version Presented at CME Meeting
The 17th Annual Spring Meeting of the Anesthesia History Association and UT Southwestern Medical Center, April 29, 2011, Grapevine, TX.

Abstract
William Thomas Green Morton, the man most commonly associated with the introduction of anesthesia in 1846, fathered William James Morton. William James Morton's contributions to society were substantial. He conducted pioneering work in radiology, radiation oncology, and therapeutic electricity. He authored numerous textbooks and articles, and he was an editor of a journal on human behavior. His expertise on diamond mining led to an error in judgment that resulted in a felony conviction. We examine his career and contributions to society, and consider his career in light of his father, William Thomas Green Morton.

William James Morton, MD

Early years
In 1843, William Thomas Green Morton [1819-1868] married Elizabeth Whitman, the niece of Connecticut congressman Lemuel Whitman. Their first child, William James Morton (Figures 1, 2, and 3), was born on July 3, 1845, in Boston, Massachusetts, about one year before his father’s conclusive public demonstration of the anesthetic effects of ether at Massachusetts General Hospital on October 16, 1846. William James Morton received the best education available. William James Morton graduated from Boston Latin School, the first public school in the United States. Next, he proceeded with undergraduate studies at Harvard College, graduating at age 21 in 1867. For one year, he worked as a principal at a school in Gardner, Massachusetts, after which he began studies at Harvard Medical School. As a medical student in 1872, Morton was awarded the prestigious Boylston Prize for a thesis based on his father’s work on the introduction of anesthesia.

After graduating from medical school the same year, he became an assistant in the surgical outpatient department at Massachusetts General Hospital where he later became house surgeon. Next, he moved to Vienna for postgraduate studies related to diseases of the mind and nervous system. His itinerant nature took him next to South Africa in 1876, where he began a profitable mining business, while simultaneously continuing to practice medicine. He learned much about diamond mining in South Africa, and his inquisitive nature and academic skills led him to conduct research. His work entitled South African Diamond Fields: and the Journey To the Mines was presented at the 1877 annual meeting of the American Geographical Society. In 1878 he relocated to Paris and trained under the famous French neurologist Jean-Martin Charcot [1825-1893].

Clinician and Professional Activities
William James Morton returned to New York in 1880 to settle down and start a most prolific medical career. The same year, he married Elizabeth Lee, daughter of a prominent coal merchant. His father-in-law, Mr. Washington Lee, presented the newlyweds with a substantial house at 36 West 56th Street in New York City (Figure 4). Morton’s medical office and treatment chambers were located on the first floor, while the family lived on the upper floors. The couple did not have any children, and in later years Morton married Ellen Komizer [1891-1953], who was 46 years his junior. Upon her death, she willed that her estate, amounting to $105,000, be bestowed on her three nieces. It does not appear that they had any children.

Morton’s career was remarkable not only due to an extremely busy clinical practice, but also because of his academic activities and leadership positions at professional societies. He served as president of the Harvard Medical Society of New York City (1893), the American Electro-Therapeutic Association (1893), and the New York Neurological Society (1894). Furthermore, he was an active member of the following professional societies: New York State and County Medical Societies, New York Academy of Medicine, Massachusetts Medical Society, American Neurological Association, Harvard Medical Alumni Association.
Son…Continued from Page 18

American Medical Association, Congress of American Physicians and Surgeons, Société Française d’Électro-Thérapie, Boylston Medical Society, University Club of New York, New York Electrical Society, American Geographical Society and the Roentgen Society of London. He was simultaneously pursuing disparate interests in clinical medicine, geology, mining, and electricity.

Research and Publications

In 1882, he bought and became editor of one of the oldest scientific journals on human behavior, the Journal of Nervous and Mental Diseases. He remained editor-in-chief until 1885, and it is not known when the journal left private ownership. The younger Morton was deeply affected by the fact that his father did not receive proper recognition for his role in publicly demonstrating the efficacy of ether as an anesthetic and for later promoting its use. He remained an avid advocate and defender of his father’s claims, and wrote a book entitled Memoranda Relating to the Discovery of Surgical Anesthesia, and Dr. William T.G. Morton’s Relation to this Event. He reiterates facts to support his father’s claims as the first one to convincingly demonstrate general anesthesia induced with ether. He also discusses facts related to this novel discovery and explains his father’s role in the controversy.

Morton did not devote much of his efforts to the study of anesthesia, but he did explore how local anesthesia by cocaine was influenced by electric current and by mechanical pressure.

Luigi Galvani first described the role of electric current in transmission of signals between nerves and muscle in 1791, and Alessandro Volta created the voltaic pile in 1800. Michael Faraday invented the electric motor in 1821, but it was not until the late 19th and early 20th century that electricity found use in daily life and medical treatment. Electrical current was used in the treatment of many diseases, and neurologists such as William James Morton were at the forefront of experimental treatment. He used small currents of electricity to treat several diseases and became famous for treating prominent men, including General John Charles Frémont (1813-1890, US Senator from California, 1850-51, and anti-slavery war hero), James Gillespie Blaine (1830-1893, US Senator from Maine, 1891, and US Secretary of State, 1889-92). He treated president Ulysses S. Grant [1822-85] for carcinoma of the oral cavity, and he also treated President William Henry Harrison’s [1773-1841] granddaughter Marthaena for scarlet fever in an era when antibiotics were not known.

Once Wilhelm Roentgen discovered x-rays in 1895, Morton added an x-ray tube to generate x-rays with his high voltage machine. He started working with x-rays and likely wrote the first American textbook on x-rays, The X-Rays; Or, Photography of the Invisible and its Value in Surgery. This book is the first comprehensive collection of x-ray images taken in the 19th century. He also described the scientific basis behind the generation of these emissions and how they were employed in clinical practice. He gave a lecture on x-rays at the meeting of the Medical Society of the County of New York, where he showed live fluoroscopic images of the bones of the hand. Morton used x-rays for both diagnosis and treatment, thereby becoming one of the pioneers of radiation therapy. In a manuscript describing radiation as a treatment modality, some Cases Treated by the X-Ray: Facial Cancer, Carcinoma, Acne, Alopecia Areata, Sycosis, Fibroid Tumor, Psoriasis, Lupus, Primary and Recurrent Carcinoma of the Breast; Artificial Fluorescence of Living Tissue; Morton heralds the beginning of radiation oncology and presents evidence of successful treatment for cancer.

Morton also treated some diseases using the technique of cataphoresis, a process in which mild electrical current is used to facilitate diffusion of medications through the skin. In 1898, he wrote a textbook about this modality of treatment, Cataphoresis or Electrical Medica-mental Diffusion.

The Doctors Morton

In comparing the lives and careers of father and son, we observe many similarities as well as differences. The senior Morton did not complete studies at any medical or dental school, although he is referred to as “Dr. Morton” not only in articles, but also by surgeon John Collins Warren, who remarked wryly, “Doctor, your patient is ready.” In March 1849, the father was awarded an honorary degree in medicine by Washington Medical College of Baltimore, Maryland, which existed from 1826 to 1851. The contrast could not be greater with respect to formal education, with the junior Morton receiving the best education available at that time, attending Boston Latin School, Harvard College, Harvard Medical School, Massachusetts General Hospital, performing postgraduate training in Vienna and ending with an apprenticeship with Professor Jean-Martin Charcot. The father, William Thomas Green Morton, and Charles T. Jackson were successful in receiving a patent for “letheon,” which was their name for ether (US Letters patent 4,848, November 2, 1846). Vociferous opposition to the patent from the medical and dental communities forced Morton and Jackson to disclose details of their discovery and make it freely available. In 1902, William James Morton received US patent 705,691 for developing a method for dispersing fluids, a technique that continues to have current industrial applications. Although he developed several instruments that were used in clinical medicine, we do not know whether he was unsuccessful in his attempts to secure additional patents, or whether he was not interested in securing them.

The father had many scrapes with the law and was a wanted man in several jurisdictions; however, unlike his son, he was never convicted of a crime and never spent time in prison. A short list of his misdeeds includes swindling Timothy Chapman, Loren J. Ames, Phineas B. Cook, Francis Gorton, and the Sarah Seward Seminary in Rochester, NY; cheating Charles Pomeroy, John Creagh, and J.R.W. Keyes in Cincinnati; and taking advantage of N.S. Jacobs and J.B. Sickles and Company in St. Louis. He was also found in possession of fake US Postal seals and forged bank drafts. As far as we know, William James Morton committed only one crime and justice was administered swiftly, albeit the presidential pardon softened the blow. This difference may have arisen because individuals were reluctant to pursue William Thomas Green Morton in the courts, or because William James Morton committed a federal crime, which may have made him an easier target.

Although much controversy exists about the individual most deserving of credit for the discovery of anesthesia, William Thomas Green Morton received substantial recognition, albeit posthumously. In his

Continued on Page 20
later years, he felt robbed of the acclaim for being the founder of anesthesia. A southern senator promoted Crawford Williamson Long as the originator of general anesthesia and had Long’s name and image placed on a US postage stamp. The father passed on his bitterness to his son. In contrast, William James Morton does not get well-deserved recognition for his many contributions to the fields of radiology and radiation oncology. Irrespective of these differences, both were restless, innovative opportunists, and men of action.

Felony

William James Morton’s hectic and successful life was marked by one serious error in judgment brought about by an unfortunate association he made with Julian Hawthorne, Albert Freeman, and Josiah Quincy. Hawthorne [1846-1913] was the son of the famous author Nathaniel Hawthorne [1804-1864], Freeman [1852-1938] was vice-president of the United Mining Company, New York, and Quincy [1859-1919] was a former Mayor of Boston, assistant Secretary of State under President Cleveland, and the great-grandson of Josiah Quincy II [1744-1775], also known as “The Patriot.” Morton’s years in South Africa had taught him not only about the science and technology of mining, but also about the possibility of substantial monetary rewards that accompanied successful exploration.

Morton was hired as a consultant based on his mining expertise. Morton, Hawthorne, and Freeman convinced investors of the potential of finding silver in mines within the “Cobalt Region” in Canada. They falsely claimed, using the vehicle of the United States Postal Service in their solicitations, that cobalt existed in close proximity to silver, and that these mines were an abundant source of silver. They promoted and sold mining interests while claiming yearly revenues of US $3,500,000. When in 1912 the mines were found not to contain silver, Morton, Hawthorne, Freeman, and Quincy were put on trial. During their trial, additional testimony was provided that the Hawthorne enterprise had used John D. Rockefeller as bait to draw investors into their illicit activities. The trio was found guilty on March 14, 1913, of fraudulent activity using the United States Postal Service; Morton and Hawthorne were sentenced to a year and a day in the Atlanta Federal Penitentiary, while Freeman was sentenced to 5 years and 3 days. Morton and Hawthorne were found guilty on 17 counts each, while Freeman was found guilty on 23 counts. Josiah Quincy, who was also mentioned in those activities, was acquitted on one charge of fraud after 28 hours of jury deliberation. Morton served several months in prison before political connections yielded a presidential pardon by Woodrow Wilson [1856-1924]. Upon release, he successfully petitioned to regain his privilege to practice medicine in New York, and he resumed clinical practice. Morton died of heart disease in Miami on August 26, 1913.

Conclusions

William James Morton had an outstanding medical career in New York City, and his skills were highly regarded throughout the United States and Europe. He held academic appointments, initially at University of Vermont and later at New York Post Graduate School, and it is during these years that he conducted pioneering work in radiation oncology and radiology. He was a prolific writer, authoring textbooks in radiology and radiation oncology, as well as scores of scientific articles. Remembering his father’s disappointment in obtaining recognition, he always added his own name to any technique or apparatus he described in the literature. We cannot fully explain why he has not found name recognition in these fields. Perhaps his felony conviction influenced the manner in which medical history views him. But Wilhelm Roentgen’s original contribution to developing x-rays and Morton’s lack of focus probably played a great role in Morton’s relative anonymity.

Acknowledgements

The authors would like to thank Jesse Aronowitz, MD, radiation oncologist at UMass Memorial Health Care, whose assistance was invaluable in uncovering the hidden story behind William James Morton. They would also like to thank the many helpful comments offered by the anonymous reviewers.

Reference List