

End Notes

Chapter 1

1. It should be pointed out that the outer-shell portion of the supposed levitation device, currently displayed in the Riverbank museum, is far too heavy for the small amount of acoustical energy produced. There were other discrepancies in the re-creation of the experiment as well. The engineer for the re-creation used piano strings, and the piano had not been invented at the time of Bacon's original experiment. In addition, most of the strings were not the frequencies that yield the maximum acoustical energy and many more of the predominant energy frequencies would be required. Tuning the strings might have been achieved by adjusting the strings located on the stationary outer shell while the cylinder was rotating to arrive at the exact resonance of each pair. When contemplating all the factors, some wonder if the Rosicrucian's original experiment ever did work. One thing is for certain, because of all the comments and jokes about the machine through the years, no one at Riverbank has dared to attempt the experiment again, but that's not saying no one ever will.

2. A few other items from Professor Watson's informative paper are worth mentioning. Professor Watson referenced 46 distinguished papers, none of which preceded the early 1900 papers involved in the 1922 release of Wallace Sabine's collected papers. The earliest was a paper entitled "Qualités Acoustiques de certaines salles pour la voix parlée," (Acoustical Properties for Speech in Large Halls) *Compt. Rendus*, 142, 878, 1906. Anyway, before the professor got into various aspects and derivations dealing with building acoustics, he acknowledged work done by famous scientists throughout the world. When discussing the United States, he mentions the work of Wallace Sabine, F. A. Saunders, C. M. Swan of Harvard, Dayton Miller, A. L. Foley, A. G. Webster, G. W. Stewart, L. V. King, V. O. Knudsen, E. A. Eckhardt, E. Buckingham, V. L. Chrisler, W. F. Snyder, F. C. Wentz, H. Fletcher, and L. R. Crandall. The reason they are mentioned here is that twelve of these scientists, including Professor Watson, used Riverbank at one time or another and their names appear throughout this book.

Professor Watson's reference to Riverbank was as follows: "The experiments of Wallace Sabine have been continued at the Riverbank Laboratories at Geneva, Illinois, under the patronage of Colonel Fabian [sic] with Paul E. Sabine, a cousin of Wallace Sabine, as director, who has conducted numerous investigations on absorption and transmission of sound."

3. From the same issue of *The American Architect* was the following editorial comment:

An Appreciation of the Late Wallace C. Sabine

Probably in no branch of the higher technical research in which the profession of architecture

is directly interested has greater progress been made than in that of acoustics. Professor Wallace C. Sabine, at the time of his death, had reduced to an exact science the theory of the acoustic properties of auditoriums.

At the outset, his work was largely in the direction of the improvement of acoustically bad auditoriums. In the progress of this work he succeeded in establishing certain well sustained laws that ensured the acoustic perfection of new buildings.

To have accomplished so much in the span of a relatively short life demonstrates the great mental force of the man and the sheer grit and indomitable will that enabled him to continue despite a malady which daily sapped his physical powers.

Professor Sabine was actively engaged in his work up to within a month of his death. To the very last he attacked with a mentality nothing short of the marvelous, those abstruse and difficult problems which were the basis of his research, and he brought to completion the plans for an experimental laboratory the completeness of which stands today as a monument to the man.

Qualities of enduring patience and untiring energy enabled Professor Sabine to complete a research so valuable that its transference to other and competent hands will ensure the most satisfactory progress in a work in which every architect will take the utmost interest.

In his life and death Wallace C. Sabine showed so unselfish an attitude toward his work that after his master mind was withdrawn from participation, the path was so free from obstacles as to ensure progress to a successful finality.

Chapter 2

4. Today, like the colonel, the Japanese garden is often an interesting topic: What is the meaning behind the image presented? In 1990 when a contingent of Japanese visited the lab, I gave them a tour of the garden. After telling them my interpretation of the story involving the colonel and the garden, I decided to ask them if they could explain the garden to me as they see it. First, they corrected me on one issue about my story when I referred to the teahouse as part of the shrine. They mentioned that a teahouse is a place you can rest, lodge, or dine, and, while doing so, can pay respects and offer prayer. You can even worship through a traditional ceremony whereby the visitor can find peace within himself or herself and cleanse the spirit of any evil. Thus, a teahouse is never considered a Shinto Shrine, as such, and should not be confused with what might commonly be referred to as a Shinto Temple, which, in actuality, is more of Buddhist origin. Shintoism is an indigenous religion that has gone through many modifications and has interacted with Buddhism considerably. A true Shinto Shrine usually appears outdoors in the form of a small altar or, in some cases, a pictorial image relating to a mystical hallowed spirit represented by the area it is placed. According to the visitors, the following description is a combined perspective of what the Fabyan garden represented to them: By entering the garden through the Torii, one enters the Shinto Shrine, or Buddhist Temple. The layout of scaled smaller mountains leading to a replica of Mt. Fuji is symbolic because it looks over all the teahouses and gardens of Japan. Likewise, the two linking goldfish ponds are appropriately symbolic because they connect (two unite as one) under the half-moon bridge. The various Japanese lanterns are periodically spaced throughout to light your passage through time. Combining this setting with other symbolic elements set within various traditional Japanese plants, the Fabyan garden represents the intrinsic spirit of man and nature. The Japanese Garden has been restored to some of its original magnificence by the Geneva Garden Club and the Kane County Forest Preserve Commission. Maintenance is provided by the forest preserve rangers. Today, the Japanese Garden is very popular for wedding ceremonies. The Geneva Garden Club's phase 2 of the garden restoration took place in 1992.

5. A follow-up regarding this incident appears in the Postscript under A Potential Fabyan Heiress.

6. Besides Captain John Powell, who is mentioned in Elizebeth Friedman's written account of the Riverbank class, we know that two other officers in the picture were Major Joseph O. Mauborgne and Major Parker Hitt. In 1912, Major Mauborgne broke the Playfair British Army cipher and wrote a twelve-page pamphlet about it. Major Hitt had written a small booklet briefly covering the solution of general ciphers and cipher systems, entitled *Manual for the Solutions of Military Ciphers*, which was used for some instruction in the army. Later, as a retired colonel, Parker Hitt wrote another small booklet entitled *The ABC of Secret Writing*, which was published in 1935. According to Elizebeth Friedman, Major-General Mauborgne became chief signal officer of the Army and retired in 1928, and Parker Hitt retired as a colonel in 1941. Both Hitt and Mauborgne were awarded the Distinguished Service Medal, which was unusual because it was earned for contributions made during the period between two world wars. Another officer involved with Riverbank codes and mentioned by Elizebeth Friedman was Major Frank Moorman. He became the head of the Code and Cipher Branch at GHQ France, where Lieutenant Friedman was eventually assigned.

The Riverbank Laboratory files disclosed only brief information about two other officers appearing in the graduation picture. Each remained in the service but was involved in areas other than cryptography. One was stationed at the Philadelphia Arsenal where he developed a research facility for the study of acoustics and acoustical devices for military purposes. The other was a captain in the cavalry. His interest in codes was strictly a hobby, but in a letter to Colonel Fabyan, he stated that he was hoping to be assigned to the signal corps. He also mentioned that he missed those beautiful Swedish night-in-gales of Geneva. Also, a copy of a letter was received in 1987 from Raymond Dorn stating that one of the officers in the picture was Francis X. Hufford. According to Dorn, Hufford became a high school principal in St. Charles, Illinois; taught physics; and talked about working in "the black chamber."

Chapter 3

7. Resolving the hotel controversy: The Aurora Hotel was built in 1917 and the Leland Hotel (originally called the Leland Towers) was built in 1928. Because the picture was taken in 1918, there is no controversy. The Aurora Hotel was Aurora's first large hotel, eight stories, the largest building downtown at the time. The hotel was built on a landfill covering an old swimming hole and mill race and was designated fireproof. It had an elaborate sheet metal cornice and a two-story dining area that cantilevered over the Fox River and was built to elevate Aurora's position as a regional center of commerce. The hotel represented the cornerstone of the future to be secured with the fulfillment of a landfill project involving Stolp Island; it is listed in the National Register of Historic Places. In 1988, an article in the local paper mentioned that the Aurora Hotel and surrounding area were being considered for new developments.

8. In addition to the binary code itself, one other little curve was thrown in just to further confuse anyone trying to decipher the message. The Roman alphabet was used in establishing the coded phrase. There was also another problem because each letter required five bits of input; the expression "knowledge is power" contains sixteen letters and, therefore, requires eighty bits of input or, in this case, eighty individuals would be needed to fully represent the code. Unfortunately, there were only seventy-six people in the picture. To make up for the deficit of individuals required, they strategically positioned a few people differently. Either by standing fully sideways or moved up or back (out of line), these people served as keys to direct the decoder in either direction to help fully decipher the coded message.

One account of the photo and its coded message was sent to Riverbank (1988) by Louis Kruh, a coeditor for *Cryptologia*, a quarterly journal devoted to all aspects of cryptology. An article written by Kruh appeared in the Volume 3, Number 4 issue; it was entitled "The Day the Friedmans Had A Typo in Their Photo." Kruh's itemized explanation appears to be one of the more descriptive accounts of the graduation-class photo. There were other opinions. Because

there weren't the required eighty individuals, many agreed that there were significant key individuals positioned differently to complete the message. What is obvious is that cryptology is a most fascinating and puzzling field, which is probably what the colonel was conveying in the picture.

9. Besides the knowledge is power inscription on the building, the colonel had his sculptor etch one word on each of three sides of the laboratory. On the south was the word *wisdom*, on the east was the word *caution*, and on the north was the word *science*. A clever bit of word-play by the colonel, the first letter of each word coincides with the initials W. C. S. located on the cornerstone, representing Wallace Clement Sabine.

10. Don Williams visited the Fabyan burial plot in 1989 and was able to bring back the following information: a 500-square-foot plot at the Forest Hills Cemetery in Jamaica Plain, Boston, Massachusetts, on Magnolia Avenue, Lot No. 3005, Section 16. The burial site was established by the estate of G. and G. F. Fabyan, October 7, 1874, for \$1,500. The trust deed established the burial site for the twelve family members listed here:

No.	Name	Date of Death	Remarks
1.	George Fabyan	May 1874	Colonel's grandfather
2.	Abigail J. Fabyan	July 1881	Colonel's grandmother
3.	George F. Fabyan	January 1907	Colonel's father
4.	Isabella F. Fabyan	April 1909	Colonel's mother
5.	Sarah A. Fabyan	December 1917	Colonel's sister
6.	Julia A. C. Fabyan	June 1921	Colonel's sister
7.	Abbie M. Fabyan	December 1927	Colonel's sister
8.	George Fabyan	May 1936	The colonel
9.	Nelle Wright Fabyan	July 1939	Colonel's wife
10.	Marshal Fabyan	October 1952	Colonel's brother
11.	Isabel F. Lombard	April 1960	Marshal's daughter
12.	Elenor M. Fabyan	December 1961	Marshal's wife

Chapter 4

11. For many years (during the 1960s and 1970s) the Wallace Sabine reverberation room was referred to by the Riverbank staff as the Big Room and was documented as such when staff members conducted tests in it. This designation was used because in the 1960s, four additional reverberation test chambers were constructed. These four test chambers are slightly smaller and are designated as rooms one through four respectively. The additional test rooms were built primarily so that Riverbank could expand its sound transmission and sound impact testing. These four rooms were constructed in the true Fort Riverbank tradition, each room having solid high-density double-block walls, where each 10- by 16-inch block weighs ninety-nine pounds. The designer of these chambers was Frank Tyzzer, then manager of the laboratory.

On completion of the four test chambers, the staff at the time simply referred to the larger Wallace Clement Sabine reverberation room as the Big Room or the Big Absorption Room. As it turned out, the additional four rooms, as well as the Wallace Sabine Big Room, could be used for sound power, sound absorption, and sound transmission tests. On occasion, problems in the room designation, as interpreted by the client, would occur. With the advent of the motor vehicle test room (1979), which is three times larger than the Wallace Sabine Big test chamber, Riverbank had to eliminate the Big Room designation entirely because it created even more confusion and controversy with visiting guests and clients.

Because the motor vehicle chamber became the sixth reverberation chamber, and reverberation rooms one through four were originally designated as such, the motor vehicle test chamber became room five, and the Wallace Sabine room was changed to room zero so that each reverberation room would have a number indicative of its place in the order (time) of construction.

Now that the room designations appear to be arranged satisfactorily, discussions about the re-designation of all the Riverbank rooms, including reverberation rooms zero through five; the open office plan (landscape screen) test facility; the impedance tube, light-intensity, and air flow test rooms; the museum; the classroom; the conference room; the main control room; and all the offices. There was a suggestion to change the room designations to bear the names of various Riverbank personnel who are distinguished in the field of architectural acoustics from 1918 to today. Room zero would revert to its original 1918 designation as the Wallace Clement Sabine test chamber.

In any case, this situation is being documented here and now; otherwise, in the future, some poor uninformed Riverbank employee could experience even worse trauma than I trying to correlate various bits of old data.

12. Paul Sabine referred to the lowest-octave test frequency on the organ as the musical note C at 64 vibrations per second and the highest-octave musical note C at 4096 vibrations per second, which at the time was acceptable. However, through the years, various changes have occurred. The frequencies of the musical scale have been altered. For example, middle C, which was 512 hertz, remains as the physical standard. The middle C on the international standard is 517.3 hertz, and the concert standard middle C is 523.2 hertz, which constitutes a change acoustically. The terminology associated with frequencies has also changed. Although vibrations per second (vps) still appears for other purposes, the term *cycles per second* (cps) replaced vps as the test-frequency designation as conveyed by Paul Sabine. The cps meant frequency in the United States until the push for metric conversion began. Then, the unit for frequency was changed to *Hertz* (Hz) after Heinrich Hertz. By definition, Hertz is a unit of frequency equal to one cycle per second. Unnerving isn't it? Fortunately, the word *octave* remains as a designation of a range of test frequencies.

Today, the primary center test frequencies in each octave band corresponding to the octaves used by Paul Sabine are 63, 125, 250, 500, 1000, 2000, and 4000 Hz. Notice how every number doubles from 125 up; however, half of 125 is 62.5. If you want to believe that it was raised to 63 Hz was to maintain whole numbers (rounding off), which sounds feasible and is what many believe, be my guest. However, the next octave center frequency below 63 Hz is fixed at 31.5 Hz, thus eliminating the round-off theory. Care to guess the next octave center frequency below? You're right if you said 16 Hz. As you are most likely determining by now, the science of architectural acoustics is really not regarded as an exact logical science. In fact, by the end of this book, you will be even more certain of this. Many acousticians have lost a lot of sleep, their career credibility, and their wits in trying to apply the acoustical knowledge they had to a current problem in the hopes of obtaining a logical conclusion.

In any case, the test frequencies used by Paul Sabine were the C notes on the organ, which he designated from the low C to the high C as C-1, C-2, C-3, C-4, C-5, C-6, and C-7.

13. The reference here was to the total decay time, not just the time it took to decay 60 decibels (dB). Total decay is ten to twelve seconds as opposed to the five to six seconds of 60 dB reverberation time at 100 Hz. Remember, at the time of Paul Sabine's article, the dB unit or reverberation time (60 dB) range was not incorporated yet, and the total decay time is the time in seconds that it takes from the instant the sound is turned off until the moment it is inaudible. Obviously, it was a subjective measurement.

14. Because Wallace Clement Sabine's first name was a family name, Louise Wallace Hackney could have been another Sabine relative, but no more information about her identity is currently available.

15. The fascinating thing about Paul's article is that his designated unit for sound (power) was ergs/sec. Not that there's anything unusual about Paul's preference of units, but the use of different unit designations in acoustics has periodically created some confusion, especially for the apprentice. Depending on the year of publication and the academic or technical background of the

author, various inconsistencies in unit references from one document to another can be quite commonplace. Knowledge of unit conversion is virtually a must for the acoustician. A few typical examples of acoustical unit cross-references are as follows: ergs, joules, and newton-meters for work or energy; ergs/sec., joules/sec., or watts for power; dynes, kg-m/sec. squared, or newtons for force; and psi, dynes/cm squared, newtons/m squared, or pascals for (sound) pressure.

Additional acoustical units such as phons (loudness), sones (linear unit of loudness), noys (linear unit of noise) and rayles (airflow resistance) can create other uncertainties if not properly defined.

16. When questioned in 1979 about that day long ago, Hale Sabine indicated surprise that the event was actually documented. He chuckled ever so slightly, cleared his throat, and stated, "Yes, that was most exhilarating; however, my father was most persuasive, so that occurrence was my first, last, and only time I ever got to ring the Riverbank bell."

Chapter 5

17. Paul Sabine felt it was important to become an active citizen and to support those institutions and activities in Geneva that he found worthwhile and important. Paul Sabine's civic energies were channeled into the public library on whose board he served for 26 years.

During the 1920s, while serving on the library board, Paul Sabine became acquainted with another board member, William C. Wood. At the time, Bill Wood was an employee of the First National Bank of Geneva. Unknown to Paul, in the years to come Bill Wood would play a significant role for Riverbank. However, back in the 1920s, Wood was just then establishing himself as perhaps one of the more highly respected citizens of Geneva.

Bill Wood's success story begins soon after he graduated from high school. Then a nineteen-year-old farm boy delivering milk to Geneva, he was offered the opportunity to become involved in the banking business by the bank's first cashier, A. R. Dow. Bill accepted, and from that day on he began a most distinguished career in serving Geneva. Not only was Bill Wood acknowledged for his outstanding accomplishments in the banking business, going from handyman to cashier to president but he was also Geneva's city treasurer for two years, mayor for four years (1937-1940), a member of the library board for eight years, and a war veteran who became the first adjutant of the Fox Valley post of the American Legion and later post commander. Wood also served over fifteen years on the executive board of the Boy Scouts of America. In 1942, he was nominated vice-coordinator of civil defense (Kane County) and later became one of the pioneers in establishing the Geneva Historical Society. In his spare time, he was a master craftsman in woodworking.

However, it is Mr. Wood's tremendous efforts as trustee for Riverbank until 1986 that is most appreciated by us. Without his efforts, much of what is Riverbank as we now know it today might not have been. The Riverbank success story was as much a part of Bill Wood as anyone else. William Wood passed away in April 1990.

18. Many acousticians incorrectly claim that the first published data were from the American Materials Association (AMA) in the 1930s. Yet, Paul Sabine released manufacturer's product data before the 1930s as did the National Bureau of Standards. The AMA journal, however, was the first manufacturers' periodical on the acoustical properties of various products.

19. Today the Acoustical Society of America has more than 6,000 members and is continually growing. The expertise of the members covers a magnitude of topics that fall basically under the following twenty primary categories: (1) architectural acoustics, (2) biological response to vibration, (3) engineering acoustics, (4) musical acoustics, (5) noise, (6) physical acoustics, (7) psychological acoustics, (8) physiological acoustics, (9) shock, (10) vibration, (11) speech communications, (12) underwater acoustics, (13) nonlinear acoustics, (14) general, linear acoustics, (15) ultrasonics, (16) quantum acoustics, (17) signal processing, (18) bioacoustics, (19) aeroacoustics, (20) macrosonics. A more detailed list of categories is presented in the Postscript.

20. The St. Valentine's Day Massacre still has a negative impact on some individuals visiting Chicago. Nevertheless, attendance at the ASA's 100th meeting in Chicago in 1983 placed it among the top twenty of all ASA meetings from 1929 through 1987.

Chapter 6

21. Others also recognized Paul Sabine's expertise in science and religion, including the famed American news commentator Edward R. Murrow. On Paul's seventy-fifth birthday, January 22, 1954, he appeared on Murrow's television show and discussed various issues on the subject.

22. In 1991, Cyril Harris contacted Riverbank to find sources for a book he wanted to publish with more recent absorption data.

23. The individual responsible for maintaining the official data, administrative records, and much more throughout the last years of the Acoustical Materials Association, Acoustical and Insulating Materials Association, and Acoustical and Board Products Association was Robert La-Cosse, who still possesses many of the acoustical records from these groups. Currently, he is connected with the American Hardboard Association, which still publishes fire ratings but has not dealt with acoustical data since 1977.

Chapter 7

24. In 1985, an American Society for Testing Materials (ASTM) task group was formed to investigate the door-leak problem, with me as delegated chairman. After the first eighteen months investigating the leak effect with the latest state-of-the-art equipment, we were somewhat proud in coming up with the current conclusions stated in the proposed standard; however, we found afterward, when reading through Paul Sabine's publications, that he came up with virtually the same conclusions back in 1932 with using crude equipment.

25. At the 1988 American Society for Testing Materials (ASTM) meeting in Toronto, Canada, the chairman of the task group evaluating the noise-reduction coefficient (NRC) single-number rating announced that after reviewing various combinations, there does not appear to be any valid reason to change the existing single-number rating scheme.

26. In September 1939, A. H. McDannald, editor in chief of the *Encyclopedia Americana*, contacted Paul Sabine to revise or rewrite the section on acoustics originally written by Wallace Clement Sabine. Paul agreed. He found that someone had incorrectly revised the original article by inserting material that could not have been written by Wallace Sabine, such as "Emil Berliner acoustic discs." Paul stated that the article says that these discs are a means of correcting acoustical difficulties; however, this information did not surface until after Wallace Sabine died, and their ability to correct acoustical problems was virtually nil. Paul thought that because so much had been added to the science of acoustics since Wallace Sabine, the article should be rewritten completely. The editor agreed; the rate was \$7.50 a page for revisions and \$15.00 a page for new material. By October 26 Paul submitted 22 pages. They were printed in their entirety in the next issue of the encyclopedia. Paul referenced six other publications: (1) *A Text Book on Sound*, E. H. Barton, London, 1914; (2) *Modern Acoustics*, A. H. Davis, New York, 1934; (3) *Speech and Hearing*, Harvey Fletcher, New York, 1929; (4) *The Science of Musical Sounds*, Dayton C. Miller, New York, 1916; (5) *Applied Acoustics*, H. F. Olson and F. Massa, New York, 1934; (6) *Acoustics and Architecture*, Paul E. Sabine, New York, 1932.

27. Paul Sabine met with Charles Moller of Budapest. They had dinner at the Cliff Dwellers in Chicago. Then Moller visited Paul's laboratory at Riverbank. Apparently, they discussed politics because shortly after Paul wrote to Moller and he referenced their discussions about how FDR's New Deal was not checking the Depression. The pump-priming practices were causing many problems. Paul ended his letter by stating, "All thinking people realize that the United States like

the rest of the world is facing a profound change in our economic system. Our greatest hope is that this change can be effected without the destruction of those values in social life and political liberties which we cherish." Apparently, things have not changed much.

Chapter 8

28. As recently as September 11, 1989, the article "Resounding Success" by Gino Del Guercio appeared in the Tempo section of the *Chicago Tribune*. In this article there appeared this question and statement: "What makes a concert hall perfect? Art and the magic of science." The article included a picture with the following caption: "The New York Philharmonic's Avery Fisher Hall reopens after reconstruction: When it was born it was an acoustical turkey." The author briefly explained the many problems involved in designing concert halls. He discussed such noted halls as Boston's Symphony Hall; Philharmonic — Avery Fisher Hall; Grosser Musikvereinsaal in Vienna; Berlin Philharmonic; and the Evangeline Atwood Concert Hall in Anchorage, Alaska. The author referenced acoustical consultants Wallace Sabine, Leo L. Beranek, Cyril Harris, and Christopher Jaffe as well as electronic acoustical engineer, Mark Holden and Boston Symphony Hall violinist Harry Ellis Dickson.

Chapter 9

29. Because of his war work at Harvard, the Riverbank files have no record of Paul Sabine ever working on any project for the National Noise Abatement Council (NNAC) after 1942. It appears that when the war ended so did the NNAC.

Although the Acoustical Society of America (ASA) dropped the NNAC logo, it maintained a technical committee on noise that is still active. Thus, Paul's original efforts in getting the ASA involved were not in vain. The ASA is continuing to do its part to resolve community noise problems. If it and the new American Society for Testing Materials (ASTM) subcommittee decide to combine efforts, it could be another giant step for more quiet.

Another organization that is still active in community noise is the National Association of Noise Control Officials (NANCO). As a member, I enjoy reading the monthly bulletin entitled Vibrations. The NANCO slogan is "working together for a quiet environment." Perhaps NANCO, ASTM, and the ASA could provide the much-needed catalyst to provide quiet to the world. There is even some speculation that Washington might reconsider involving the government again in noise abatement, especially in regard to product labeling, truly a competitive plus factor in lowering the noise levels of various noise-emitting devices.

30. With Paul Sabine's help, these two groups established the basic criteria by which community noise standards were measured nationwide. During the following three decades, various projects to provide quiet were started throughout the United States, primarily with financial support from the government, which became active in community noise control and established specific departments within the Environmental Protection Agency and the Office of Safety and Health Administration. Unfortunately, during the early 1980s, these departments were victims of cutbacks, and many government noise-control programs, as well as the noise control departments themselves, simply disappeared. A few states and communities maintained noise codes, but enforcement became limited.

Fortunately, in 1988 a contingent of individuals concerned with the ever-increasing community noise problems was able to organize an official American Society for Testing Materials (ASTM) subcommittee in E33-09 entitled Community Noise. The subcommittee's intention was to establish either an Acoustical Society of America or an ASTM standard that could be used in community noise ordinances and could provide a basis for enforcement.

31. One year earlier in January 1941, Paul Sabine offered the lab to the National Bureau of Standards (NBS). Paul wrote letters to NBS Director Lyman, J. Briggs, V. Chrisler and Alexander

Elliott. Paul felt that because all their efforts to standardize the sound absorption tests between both facilities had succeeded, perhaps the same could be done with hearing aids. Three months later Paul wrote William F. Snyder, also of the NBS, about Riverbank's participation in hearing aid testing. In all instances, the bureau's responses were courteous, somewhat hopeful, but after one year, nothing materialized. Perhaps the threat of war was why nothing ever got off the ground.

32. In 1943 Robert Kerfoot became an invalid with arthritis and was in a wheelchair for a short time during which Hale Sabine took charge of the testing. Also in 1943 Kerfoot was asked to assist in the war effort, and he left Riverbank for Waltham, Massachusetts where he started work on radar for the Raytheon Corporation.

33. Paul Sabine's magnificent efforts on submarine detection at Harvard are not included in the Riverbank files, thus the limited explanation of what Paul Sabine was doing during most of the war years. Much of what appears here about this work was obtained from other sources. Leo Beranek, who was involved in the same work, has many interesting accounts of what took place during these hectic years.

In researching Paul's career, it was mentioned that the Smithsonian Institute had some slides donated by Paul Sabine. After visiting the Smithsonian and coming up short, one of their dedicated staff members continued to search the records for the slides and three days later located them. The telephone account of what the staff member saw in the slides was that they dealt with "some kind of Harvard submarine project." The staff member said that they had trouble locating the slides because they were donated by Cornelia Sabine, not Paul.

34. The Riverbank files contained an entire portfolio of published papers on hearing that Paul Sabine wrote. The titles of the last six papers he published before retiring are as follows:

1. "The Acoustical Society and Noise Abatement." Presented at the twenty-sixth meeting of the ASA, October 24–25, 1941; 1942, *Journal of the Acoustical Society of America* (JASA) 13(3):207–209.
2. "On Estimating the Percentage Loss of Useful Hearing." *Transactions of the American Academy of Ophthalmology and Otolaryngology*, January–February 1942.
3. "Noise Abatement." *Hospital Management*, May 1942.
4. "Acoustical Properties of Small Cavities," JASA, 14(1):74–78.
5. "The Problem of Industrial Noise." Presented before the Industrial Hygiene Section of the American Public Health Association at the seventy-second meeting in New York, October 13, 1943. *American Journal of Public Health*, 34(3).
6. "Acoustical Amplification by Hearing Aids," 1944, JASA 16(1):38–44.

35. As noted, individual companies frequently make public the data about their own products. Even though most of the companies are honest, there have been documented cases where a particular manufacturer has falsified data results to better his competitors. In some instances, these data have even included a test-number designation similar to that of a reputable laboratory. For example, Riverbank used to list an absorption test as follows: A83-525, where A equaled absorption test, 83 equaled the year tested (1983), and 525 indicated that this test was the 525th test that year. Riverbank questioned the use of this type of designation by another party but was informed that there was nothing legally binding in this particular form of designation. Riverbank then registered its logo RAL as a trademark; so, now the same test designation appears as RAL™-A83-525.

Chapter 10

36. Hale's director of engineering, Wallace Waterfall, is another individual whose name would pop up quite often when I researched the Riverbank files. When discussing Waterfall with certain Acoustical Society of America (ASA) dignitaries, I noted that he is regarded as perhaps the

most predominant rulemaker and policymaker of all ASA members ever. Apparently, many of the stringent ASA policies that remain today were initialized by Wallace Waterfall, especially the policies establishing what is printed in the journal and what procedures take place at ASA meetings.

Waterfall was a pioneering member of the ASA, the ASA's long-time Secretary, and late Treasurer. Waterfall was also a predominant and powerful factor in many Acoustical Materials Association (AMA), National Noise Abatement Council (NNAC), and ASA matters that also involved Paul Sabine and, later, Hale Sabine in one capacity or another. When you consider Hale's diligence and tenacity for procedure and detail, Paul's scientific and technical expertise, and Wallace Waterfall's administrative and power-based influences, the three were truly an effective team. Waterfall would eventually leave The Celotex Corporation. His name surfaced often and his correspondence usually had The American Institute of Physics or the ASA letterheads.

37. Mahlon Burkhard is also a member of the Acoustical Society of America (ASA). Mahlon has served on many local (Chicago chapter) and national ASA committees and is still very active in ASA affairs.

After leaving IIT Research Institute Burkhard served as chief administrator of the Industrial Research Products Corporation. In 1989, he retired from that corporation. By 1990, he decided to utilize his background and experience to organize Electronic Architecture Techniques, Inc. After many years of residing in the Chicago area, Mahlon and his charming wife Charlotte moved to West Virginia.

38. Robert (Bob) Beyer is well known throughout the society; he is a past president and is the current treasurer. Beyer's expertise in physics, acoustics, and many other subjects is understood as a matter of fact throughout the society. Bob contributed to this book in his willingness to talk with me, clarify some statement or event, or find a reference that appeared to be a dead end. Brown University truly had a well-versed professor, and I envy those students who had the opportunity to be instructed by Professor Robert T. Beyer.

39. I am acquainted with Dan Martin, who during my work on this book served as president of the Acoustical Society of America (ASA). He had a 35 year acoustical research career with the Baldwin Piano Company. Martin is active with Acoustical Society matters as editor-in-chief and is currently an acoustical consultant and a member of the National Council of Acoustical Consultants (NCAC). During the 1994 Wallace C. Sabine Centennial in Cambridge, Massachusetts, I conducted the ASA taped oral history of his life.

Postscript

For those interested in the Riverbank Community, this postscript is a collection of notes that although related to are not intended as part of the preceding Sabines at Riverbank story.

I was permanently assigned to Riverbank Acoustical Laboratories by my parent organization, the IIT Research Institute in 1976. After reading the Wallace Clement Sabine biography, I began digging through the junk room (now the museum) to find all I could about Riverbank. I became intrigued by the history and constantly pestered Don (Mr. Riverbank) Williams about anything and everything I could about this fascinating place. Don decided that because he was getting close to retiring, he would pass the duties of client tour guide over to me. Thus, with Don's help, I also gained a job-related purpose to learn all I could about Riverbank. Then, one day an article about Riverbank, the third article within a year, appeared in a local paper. After reading it, Don threw it down on his desk saying, "Garbage! Garbage! Garbage! Why can't anyone print the truth about Colonel Fabyan rather than all the garbage that others managed to come up with?" Don then turned to me and said, "If you really want to know all about the history of this place, I'll tell you what I can recall on one condition...if and only if you promise me, you will document what I say or from whomever or whatever you find about Riverbank that can be regarded as fact. Just so I can retire from Riverbank knowing that at least one document about this place tells it like it was." I agreed, not at the time anticipating that a book would result.

In this book, I have tried to be true to my promise to Don. I focused on the Sabines to provide the chronology for the story. A number of anecdotes were omitted, because they were tangential to the story line, but I have assembled them in the postscript, rather than omit them.

Colonel Fabyan

The following material expands on the information and stories already given about Colonel George Fabyan and Riverbank.

Fabyan Villa Museum

Colonel Fabyan's villa is now a museum operated by the Kane County Forest Preserve District. The story of how that came about and some updated information regarding the museum follows:

In 1939 Kane County purchased the Fabyan property east of route 31. It included the villa, which was turned into a museum housing many of the artifacts that were previously displayed or stored in the Riverbank laboratories across the highway. The viewing space of the museum dwindled until the late 1970s when only the living room remained open to the public.

During the 1970s the colonel's villa was used as living quarters for various county employees and other temporary help. Needless to say some damage resulted and a few of the colonel's artifacts, such as a magnificent authentic Chinese gong, were either stored, sold, or perhaps confiscated. With luck, some, if not all, of the missing artifacts might surface someday and be returned.

In 1975 the county closed the museum and it remained so for five years pending various options being considered by the county forest preserve officials. Fortunately, a group of concerned citizens known as the Friends of Fabyan made an offer to the county to reorganize the villa-museum and re-open it to the public. The county accepted the group's offer and it re-opened in the summer of 1981. On a positive note, because the villa was owned by the county, it was spared possible owners who might have modernized it, thereby changing the original architecture. It was not common knowledge that the villa was a Frank Lloyd Wright endeavor. It was the Friends of Fabyan who located the original preliminary plans for the Frank Lloyd Wright designed villa at Talieson West archives and they presented copies to the Kane County Commission.

The county then hired Edward and Marie Frasz as caretakers. The Fraszs, with the assistance of the Friends of Fabyan and the county, began renovating the villa as well as the rest of the estate. They were able to bring back much of the Fabyans's original Riverbank image.

Shortly after the villa museum opened to the public, Edward Frasz passed away. Fortunately, Marie Frasz stayed on, maintaining the villa and serving as curator for the villa museum until 1995. Marie scheduled tours of the villa and conducted most of them herself. Currently, more than 10,000 visitors a year enjoy the villa and the Dutch windmill. Indeed Marie, the Kane County Forest Preserve District, and the Friends of Fabyan deserve most of the credit for preserving the important structures located on what is now known as the Fabyan Forest Preserve.

The villa museum displays much that was located elsewhere on the estate when the colonel resided there. This included artifacts representing the animal kingdom such as a large swordfish and stuffed and mounted animals including fish, bear, birds, buffalo, and miscellaneous small game. In the museum is a glass case containing a mummy holding a child. Inside the case an inscription reads "bone" and an arrow points to the bone exposed through an opening in the mummified-look wrapping around one leg. A few years ago an anthropologist performed a nondestructive scientific investigation that disclosed the only thing in the mummy that ever had to do with anything living was this one bone which once belonged to a dog. Perhaps the origin of the mummy can be explained by the colonel's close friendship with P. T. Barnum of circus fame. There are many authentic items in the museum, however, such as natural history exhibits, historic photographs, a Japanese Samurai suit of armor, oriental artifacts, as well as Fabyan scientific and war memorabilia.

In 1996 most of the natural history exhibits were relocated to Tekakwitha Woods Nature Center, north of St. Charles, Illinois. During the summer months, the villa museum is open to the public for guided tours on Wednesday, Saturday, and Sunday afternoons.

The Friends of Fabyan

The Friends of Fabyan group, organized in 1979 with eighteen charter members, has grown to more than 100. The primary purpose of the group is to preserve and restore the historic structures on the Fabyan estate. Without the Friends of Fabyan's diligent efforts, fortitude, and tenacity of purpose, the restoration of the villa museum, the replacement of the two historic statue eagles, plus many other restoration-preservation projects would never have happened.

After the villa museum had been closed for five years, the Friends of Fabyan cleaned, reorganized, and reopened the museum in 1981. Since that time new acquisitions have been made and additional exhibits provided. A protective enclosure for the Japanese samurai suit of armor was built after it had been cleaned and repaired professionally.

The Friends of Fabyan provided much of the Fabyan historical data that are currently available at the museum and have researched documents and conducted interviews to establish authenticity in what is printed or restored throughout the estate. The group provides educational programs and has developed a long-range (ten-year-plus) restoration plan. Eventually, the significant historic elements that were once part of the Fabyans's estate will once again be enjoyed and appreciated by the public.

On December 13, 1988 the Kane County Board of Commissioners and the Kane County Forest Preserve District honored the Friends of Fabyan with Resolution #F.P.-R-12-88-599. The resolution honored the Friends of Fabyan, a non-profit organization, for restoring and preserving the historic

structures on the Fabyan Forest Preserve. It conveyed Kane County's sincere appreciation on behalf of the residents throughout the district — truly a well-deserved recognition.

In 1995 the Kane County Forest Preserve District contracted with Preservation Partners to operate the Fabyan villa museum. Friends of Fabyan continues to function as a volunteer support group for the overall Fabyan site. Its main focus includes artifact acquisitions for the Fabyan Villa and the development of an archivist-staffed villa resource center. The group also offers a public lecture series and provides active assistance in restoration projects.

Preservation Partners

Preservation Partners of the Fox Valley, a nonprofit organization that operates two historic house museums, supports preservation projects throughout the county and promotes preservation education through its programs and resource center. During the 1996 season, twenty-two Preservation Partners volunteer docents conducted tours and were active in the interpretive program of the Fabyan Villa.

The Eagle

The original Silvestri tower eagle mentioned on the first page of Chapter 1 was struck by lightning on July 25, 1986. Fortunately, just two weeks earlier, a contingent of the Friends of Fabyan had taken measurements and pictures of the tower eagle so that it could be duplicated to replace the deteriorated eagle statue on the island. It was thought that because of the lightning damage, the insurance would cover the costs for replacing the damaged eagle and that a duplicated eagle could be made at less expense. It was this scenario that Richard Schlindwein, then supervisor (now owner) of Riverbank Inc., agreed to with Darlene Larson, president and restoration chairman of the Friends of Fabyan. In the following months, a model together with a mold, was made, a masterful work according to all who saw it. The sculptor was Gloria Ann Rovelstad of Elgin, Illinois, daughter of the renowned sculptor Trygve Rovelstad, who, in the 1930s trained with Silverio Silvestri.

Gloria Rovelstad spent many hours on the new Riverbank eagle, in some ways outdoing Silvestri's attention to detail. Although the observer is aware that the new eagle model is a composite of clay, sand, wire, steel, and whatever, there is this incredible sensation that the soaring eagle could ruffle its feathers. One person commented, "The feathers are so realistic in appearance that although your brain tells you otherwise, you cannot escape the feeling that they would actually fluff if you brushed them."

After making the clay model, Gloria Rovelstad began the lengthy process of making the plaster mold; when completed, Riverbank Inc. and the Friends of Fabyan arranged to have a positive casting made. The Riverbank tower eagle was to be the first casting. Unfortunately, the company hired to make

the concrete casting broke the wing mold. According to the fine print in the casting company's contract, the firm could not be held responsible if the mold broke during casting. Naturally, Richard Schlindwein was disappointed when he had to report the news to the Riverbank trustees that the casting company required another wing mold. It would cost several more thousands of dollars with no guarantee that the second mold would not break. Because the insurance money for the damaged eagle was diminishing, it appeared that the eagle project was doomed.

Fortunately, Darlene Larson and the Friends of Fabyan were not about to quit. With the assistance of Schlindwein and the Riverbank trustees, it was decided that with the remaining insurance money — and to prepare for the possibility of additional problems — the sculptor would cast a plaster-of-paris mold. Then, Darlene Larson, with the support of the Friends of Fabyan, explored a variety of ways to complete the project so that two eagles could still be cast. Research began again for another company to do the casting. Orlandi Studios in Chicago came highly recommended, and the suggestion was made that fiberglass, instead of concrete, be used.

The first mold, as well as the newer plaster-of-paris model, was delivered to Orlandi Studios for consideration and a bid. After investigating the new molds, its answer was, "no problem." By using Gloria Rovelstad's original mold with a fiberglass composition that looked like the original concrete, Orlandi Studios was able to make both eagles at considerable cost savings. Eventually, combining Riverbank Inc.'s remaining insurance money and additional finances provided by the Friends of Fabyan, the casting portion of the project was completed when both eagles were cast. One eagle was mounted on the island in September 1988. The Kane County Forest Preserve District paid for mounting as well as the mold.

All was not going well, however, with the tower eagle. Schlindwein announced that a new problem centered on providing adequate insurance. Apparently, no one wanted to take responsibility for all the hypothetical calamities that could occur in putting up the eagle. Once again, it appeared that an eagle would never be installed on the tower. Eventually, though, through the determination of concerned parties who would not allow the problem to remain unresolved, the contractor agreed to install the eagle. On October 7, 1988, an eagle once again soared atop the tower at Riverbank Acoustical Laboratories.

The Riverbank Acoustical Laboratory Tower Bell

Riverbank is often asked about the bell located in the laboratory tower. It was manufactured by Henry McShane & Company of Baltimore, Maryland in 1885. It is constructed of two inch thick bronze and measures thirty-six inches diameter at the base, twenty-two inches diameter at the top (neck), and is twenty-nine inches high. Its key is in the A, A# range of 440-450 Hz. The bell is operable and rung on special occasions.

The Lion

In 1983, although quite weatherworn, the still-intact Silvestri lions were damaged by an overzealous truck driver attempting to maneuver a wide truck between the columns adjacent to the two laboratories where the big cats perched. The lions were replaced by locally purchased replicas of a quality that rivaled that of the originals.

The Windmill

In 1979 the Fabyan windmill was placed on the National Register of Historic Places. In 1980 the windmill was honored as part of a U.S. postage stamp series that featured five windmills in this country. When a crew was reshingling the windmill, a listing was found of some of the men who originally rebuilt the mill in 1915. Those listed were Oscar Wilson, Charles Lindahl, Ben Anderson, Carl Peterson, Martin Seastrom, Dick Swanberg, and Eric Swanson. Friends of Fabyan have been instrumental in assisting the county in interpreting and maintaining this historic landmark. The windmill is open to the public on Saturday and Sunday afternoons during the summer months.

A Potential Fabyan Heiress

When leaving the lab one night in November 1984, a car pulled up in the driveway and a middle-aged woman got out and asked if this was the house Miss X (the name of a mistress of the colonel) had lived in, pointing at the grey house next to the lab. I said, "Yes." Curiosity aroused I asked, "Were you or someone you knew ever involved with Riverbank?" She replied that her mother was involved with the colonel once. She immediately stated, "Oh! no, not in the way you may be thinking, but rather under a strange set of circumstances. You see, my mother was in the hospital having me and she shared the room with Miss X, who had just had a miscarriage." She continued, "My mother had told the story many times about the wealthy colonel who had offered a lot of money for me. So while growing up, my mother and I often discussed the fact that I could have been very rich as the colonel's daughter but the love my mother and I shared could never have been equalled. Of course, there were times I recall daydreaming of living the life of a wealthy heiress at Riverbank." Then, she paused and continued, "You see, we were very poor, especially then ... by the way, my mother and Miss X remained in touch for some time and I remember one time we joked about what if the colonel had purchased me and if by chance my real mother was visiting Riverbank, in the same room with Miss X, and Mrs. Fabyan, and if I yelled Mommy! Who would have responded? Imagine if all three had, it sure could have created an embarrassing situation." She chuckled, even while telling me, a perfect stranger; however, I remembered chuckling too. Anyway, it was a heart-warming event primarily because of her attitude toward the entire situation

and because of her obvious love for her departed mother. I explained the current status of Riverbank to her. She took a few pictures and departed saying, "Money isn't everything ... right?" "Right!" I replied and then spent the next hour driving home thinking, "right? ... right ... well ... partially right, well ... ok, right." Writing about a millionaire has certain drawbacks.

The Kobayashi Family

On November 13, 1939, after both Fabyans had passed away, Susumo (Oscar) Kobayashi, his wife Suye and children Sumiko, Noboru, and Michiko left Riverbank for San Leandro, California. They lived there until 1942 when because of the outbreak of World War II, the U. S. government interned all Japanese Americans. The government relocated the Kobayashi family to the Tanforan Assembly Center (a race track) and then to the Topaz, Utah Relocation Center. In 1944 the family was relocated to Hartford, Connecticut and later moved to Wallingford, Pennsylvania. The Kobayashis have remained in the eastern area ever since. In 1963, at the age of 71, Susumo retired from active gardening, took a trip back to Japan after a 40-year absence, and then returned to Philadelphia. He passed away in December 1975.

The Kobayashi family had apparently developed a close friendship with Paul Sabine. A letter in Paul's files, addressed to Miss Sumiko Kobayashi in San Bruno, California, indicated his concern about the ordeal the family was facing about possible internment during World War II. Paul was also concerned about the difficulty Sumiko had in entering a college and he offered some encouragement and assistance.

Don Williams and his sister, Ethylmarie, gave a talk at the Riverbank Acoustical Laboratories, during the late 1980s about their childhood days at Riverbank. They told a story about Sumiko Kobayashi and Colonel Fabyan that illustrated Fabyan's brusqueness. According to Ethylmarie, she and Sumiko plus some other children were all at the pool one day when Colonel Fabyan happened to come by. The colonel noticed that the only one not going into the deep water was Sumiko. After finding out that she could not swim, the colonel ordered her to jump off the diving board stating that it was the only way she would ever learn how. Although petrified, Sumiko jumped, panicked, and had to be rescued after almost drowning.

A Fabyan Scientific Tribute

In researching one of many of the colonel's scientific projects, Marie Frasz, then the curator of the villa, was able to provide me with a photocopy of a written account that substantiates the colonel's valuable efforts in completing one of these projects. The project, as well as the Colonel's efforts, are best stated in the photocopy of the cover, dedication, and acknowledgments of a book that resulted from the completion of a successful project. The book is entitled *The Thinking Body, A Study of the Balancing Forces of Dynamic*

Man, by Mabel Elsworth Todd. From 1937 to 1979, the book had seven printings. Here are some portions of what was stated about the colonel by the author. The dedication on page 14 read, "Dedicated to the memory of the late Colonel George Fabyan of the Riverside Laboratories of Geneva, Illinois. In grateful appreciation of his vision of the importance to life of the subject matter of this book and of the many aids extended in furtherance of its science."

From Acknowledgements on page 15:

In dedicating this book to the memory of Colonel George Fabyan, I record my lasting sense of obligation to him for his help during a friendship of many years. The tangible quality of his aid is indicated by the fact that he established a room in his laboratory equipped especially for the use of myself and my assistant teachers, in the study of physics, physiology, and anatomy, as applied to our problems of bodily balance; and by his generosity in furnishing professional instruction and laboratory materials for our use; and by his interest in providing appliances to be used in correction and reeducation of physical maladjustments, including electrical appliances for experimentation in muscle action. All these and many other aids were extended to me because of the vision of a truly great humanitarian.

Mabel Todd recognized the assistance of another Fabyan in the acknowledgements. She wrote: "To Dr. Marshall Fabyan, of Boston, I wish also to express gratitude for his generous and helpful expenditure of time and thought in the years of preparation of this work."

Fabyan-Riverbank Articles after 1936

Newspaper articles about the colonel or Riverbank often appeared in the years following the colonel's death. The inaccuracies in many of these articles is the *raison d'être* for this book. For example, one author mixed up Colonel Fabyan's X-ray project with Nelle Fabyan's poise classes:

Not so Scientific, but interesting, were his experiments in developing a "Blue Ribbon Flapper." Disturbed by the languorous droop of the debutante of the 20's, Col Fabyan engaged a staff of physical culture experts to work with some volunteers of the younger set. Attributing their slouched posture to the peculiar dances of the time, he asked: "What will the next generation be like if the women of today have hollow chests?" Announcing later that postures were improving, he remarked: "They are learning to stand erect, not like anthropoid apes just learning to walk."

In any case, the Fabyan legend expanded because of such inaccurate reporting. What follows is a list of a few articles, some good, some inaccurate, which appeared after the death of the colonel:

Aurora Herald, August 6, 1939, "Shakespeare Mystery Key in Fabyan Books" by Jayne Miller.

Aurora Daily Beacon-News, December 14, 1939, "Buy Fabyan Estate for Park." Reporter unknown (same story printed in other local papers).

Chicago Tribune, September 7, 1950, "Fabyan Estate as Fabled as Its Onetime Squire," author unknown.

Chicago *Sunday Tribune*, June 28, 1959, "Estate's Days of Glory Gone; Beauty Stays, Col. Fabyan Home Now Is Forest Preserve" by George Budrean.

Chicago *Sun Times*, September 25, 1960, "George Fabyan Eccentric Genius" by Sarah Boyden.

Geneva *The Chronicle Enterpriser*, January 25, 1984, "Recalling the Days of Col. Fabyan" by Ann Pierotti.

Chicago *Sun Times*, July 1, 1984, "Fabyan's Fabled Legacy" by Gary Wisby.

Geneva *The Chronicle Enterpriser*, July 24, 1985, "Our Own Mad Scientist?" by Molly Bolger.

Chicago *Tribune*, August 10, 1987, "Out of Success Came Legends of Col. Fabyan" by Katherine Seigenthaler.

Illinois Magazine, March–April 1987, "The Far-From Average Fabyan Forest Preserve" by Susan M. Kryger.

"Deciphering Secrets Is Fascinating Occupation" by DuBois K. Wiggins (Newspaper and date unknown).

Historic Illinois, December 1987 "The Fabyans' Fabulous Geneva Retreat," by David Newton.

Geneva Quarterly Magazine, Fall 1988, "Historic Fabyan Forest Preserve" by Ann Wilson (the winter issue of the same magazine covered the scientific goings-on at Riverbank).

The Riverbank Ghost

Through the years a number of odd occurrences or sightings at Riverbank Lab have been attributed to the ghost of Colonel Fabyan. Although I have spent many a night at the lab and have heard some eerie noises and observed strange happenings, I cannot claim to have actually seen the colonel's ghost. Since the night the eagle was struck by lightning, however, no sightings or ghostly noises have occurred.

William Friedman

During World War II, cryptanalyst William Friedman was reinstated in the army, eventually rose to the rank of colonel and became known as the man who broke the Japanese Purple Code. A book highlighting his career at Riverbank and in Washington D.C. was entitled *The Man Who Broke the Purple*. In the book, the Friedmans did not refer to the colonel very favorably, but it was clear that they loved Riverbank and Nelle Fabyan very much.

There were some at Riverbank who felt that Elizebeth Friedman was perhaps better in breaking certain types of code than her husband. She assisted many civilian companies and police agencies throughout the world. As a team, they were extraordinary. William F. Friedman died November 3, 1969 at the age of 78, and Elizebeth Smith Friedman died on October 31, 1980 at the age of 88. Both were justifiably recognized in the press for their efforts involving codebreaking. Interestingly, one of their last published efforts was in 1957, *The Shakespearean Ciphers Examined*. In the book, they included a

cipher that stated, "I did not write the plays. F. Bacon." In their own clever way they stated their opinion of the initial project that had launched their professional codebreaking and marital careers in 1915 at Riverbank.

The Bacon-Shakespeare Controversy

Besides the Friedmans's repudiation of her findings, others also feel that Elizabeth Gallup's theory about Sir Francis Bacon was out of the realm of fact and that she never would have been able to provide substantial proof to convince historians and the British Parliament of her theory. However, an ever-increasing number contend that Gallup's theory is correct, and it is only because of the arduous task of changing the history of Shakespeare and the money his name provides to England that the British Parliament ruled her findings nonpersuasive. Also there were allegations made by Gallup that Sir Francis Bacon could have been the illegitimate son of the queen, allegations now shared by others.

As far as the work done at Riverbank on the Baconian codes, Jane Miller expressed a viewpoint different from the Friedmans in the *Herald* on August 6, 1939; the article was entitled "Shakespeare Mystery Key in Fabyan Books":

Who wrote Shakespeare? This question of the literary world has had as many answers as there are Shakespearean authorities. Some claim it was Francis Bacon, who they are sure was the illegitimate son of Queen Elizabeth and heir to the English throne. Others say the plays were not the work of any one man. And a few scholars will even give credit to William Shakespeare himself.

Col. George Fabyan, multi-millionaire cotton broker, spent fifty years of his life and a fortune endeavoring to solve this question. He collected an unequaled library of first and only editions of Elizabethan authors. His agents scoured the world buying rare code books which he used to decipher the works of Shakespeare. Just as the colonel was on the verge of solving this controversial issue, death put an end to his work.

Shakespearean authorities in Chicago yesterday voiced a demand that the work to which Col. Fabyan gave his life should not stop with his death. His famous library was left in the will of his widow, Mrs. Nelle Fabyan, to the Congressional Library in Washington. Thus Shakespearean scholars feel, the government is in a position to fulfill Fabyan's ambition and settle once and for all the question of who wrote the plays of Shakespeare.

Of his library, Miss Adele Cumming, secretary to Mrs. Fabyan and coexecutor of the estate, said: "Even in his boyhood the colonel was very interested in ciphers. They became a ruling hobby with him and he spent a tremendous amount of money collecting rare old cipher books. In his collection are several originals of code deciphering books from the fourteenth century.

As the colonel's interest in ciphers grew, he took up the famous dispute about who wrote the plays of Shakespeare. In 1916, his enthusiasm involved him in a lawsuit with Colonel William N. Selig, one of the first motion picture magnates.

Selig argued that Fabyan's contention that Bacon wrote the works accred-

ited to Shakespeare was keeping the movie public away from his epic on the life of Shakespeare. The victory went to Fabyan when Judge Richard S. Tuthill of the Cook County Circuit Court ruled that Fabyan's findings conclusively proved that Bacon was the author of Shakespeare's plays. However, so much pressure was put on Tuthill by the other county judges that he was later forced to recant his decision.

Throughout the years, the Bacon-Shakespeare controversy cost the colonel more than \$500,000. Of his research, Cora Jensen, secretary of the laboratory at Riverbank said,

Although the colonel first believed that Shakespeare's plays were the product of Francis Bacon, by the application of Bacon's bi-lateral cipher to the books of Elizabethan authors such as Shakespeare, Bacon, Marlowe and Spenser, he became convinced the writings of that period were the work of the Rosicrucian Society. ... This society controlled all the printing of that period. The colonel believed that everything printed under their auspices had an underlying meaning known only to those who could decipher the code.

Col. Fabyan's interest in ciphers led him into further fields. Through their mutual hobby he met Dr. Wallace Sabine, acoustics authority of Harvard University. To help Dr. Sabine in his work the colonel built in 1918 an acoustical laboratory on his estate. Dr. Sabine died before he could make use of the fine collection of instruments and the laboratory was turned over to Dr. Paul E. Sabine, a cousin of the Harvard professor, who is still in charge.

Supporting the colonel's later theory regarding the Rosicrucian Society was an April 14, 1989 PBS television program entitled *Frontline: The Shakespeare Mystery*. The viewpoints of notable British and American writers, historians, scholars, and researchers that strong doubts exist that William Shakespeare wrote the plays attributed to him. Although Sir Francis Bacon was included as a candidate for authorship, the program indicated Edward de Vere, the seventeenth Earl of Oxford was a more likely choice. Near the end of the program, the commentator stated that because some of the theories presented were based on circumstantial evidence, the mystery still remains.

On August 7, 1989 a descendant of the earl, Lord Charles Buford, further supported the claims made on the television show in an article written by Bentley Boyd and printed in the *Chicago Tribune*. In addition to repeating much of the evidence presented on the PBS program, other accounts of Lord Buford's efforts to prove that the earl wrote the Shakespeare plays were cited. Lord Buford was a guest of a retired trader from the Chicago Board of Trade who had provided some financial support to the Shakespeare-Earl of Oxford project and whose hobby was also trying to prove that Shakespeare did not write the plays.

What perhaps was most intriguing about the colonel's theory was that in the opinion of some experts, both on the television show and those quoted in the articles cited earlier, more than one person had to be involved in the

Shakespeare writings. Essentially what they deduced, as highlighted in the television program, was similar to the argument expressed by Mark Twain. Mark Twain had realized how significant it was for him to have participated as a river boater to describe accurately life on the Mississippi. It was because of this realization that he questioned Shakespeare's authenticity. Mark Twain realized that besides experiencing the various changes in the landscape and the presence of many hazards along the Mississippi River as described in his writings, his learning of the unique language and terminology used by the captains and crews of the Mississippi River boats required a long time of personal exposure. Thus, to achieve the high degree of expertise and knowledge of all the various disciplines and verbiage described in all the plays and sonnets of Shakespeare in the short time span that they were written would have been impossible for any one individual to accomplish. George Bernard Shaw expressed similar views as well.

In January 1991 I received correspondence from Ian Taylor, a writer affiliated with TFE Publishing in Toronto, Canada. Taylor had written an article, "Francis Bacon and the Scientific Method," that appeared in the Winter 1989 Creation Science Association of Ontario *F.E.A.T.U.R.E.* Taylor referenced historian James Spedding's 1861 seven-volume work on the life of Francis Bacon as the orthodox account. Taylor went on to say, "However, other researchers since that date have unearthed more material and the mystery surrounding Bacon's life and silent years has slowly been revealed. It is a remarkable story."

What followed was yet another account that supported Colonel Fabyan's claim that Bacon was the son of Elizabeth I. Taylor's article states that Francis Bacon was born to Elizabeth in 1561. The father was Lord Robert Dudley, who, at the time, was married to someone else. Eventually, Taylor contends, Lord Dudley and the queen were secretly wed, and Francis Bacon was a legitimate heir to the throne. Because of Elizabeth's virgin-queen image, however, and the political climate of the times, she was never allowed to acknowledge Francis Bacon as her rightful heir.

As for Riverbank's involvement with the Shakespeare project, when the colonel died, so did his project. Perhaps the answer lies somewhere in the collection of the colonel's books and notes, now somewhere in Washington. The unanswered question is why, after all the other cutbacks in his projects at Riverbank because of the Depression, Elizabeth Gallup's passing, and the Friedmans's strong disbelief in Gallup's and the colonel's theory, would Colonel Fabyan continue to spend money on the Shakespeare project? Did he find some new evidence later in his vast collection of books. Some believe he did, especially when he changed the focus from Bacon to the Rosicrucian Society.

As far as linking architectural acoustics to Shakespeare, well that's a piece of cake. Obviously, most of you are aware of the Shakespearean phrase, "To

be or not to be — that is the question.” Well, in acoustical terms, one way to state this phrase is, “Two dB to no dB, that is the question. Can you hear?” Obviously, a modern Shakespeare — or whoever wrote the plays — I am not. (However, acousticians will say that my pun has acoustical merit, because many theoretical accounts state that it takes a difference of three decibels before humans can detect a change in sound intensity.)

A Colonel Fabyan Story Regarding Bacon Documents

This is a story that may never be published: In 1994 Mr. Frederic R. (Robin) Sherwood of Victoria, British Columbia visited Riverbank and told a fascinating story about Colonel Fabyan and Dr. Orville W. Owen of Detroit that he was still researching and planned to publish in the very near future. The story involved some unusual events that resulted from the Baconian ciphers, including a trip to England, where a river was diverted in search of some of Sir Francis Bacon’s documents. As promised, I did not include the story in this book but I am referencing it here because on September 3, 1995, Mr. Sherwood passed away and perhaps someone else may want to follow up on it.

The Sabine Family

The following material expands on the information and stories already presented about various members of the Sabine family.

The Sabine Roots

One question that I am often asked is, What was the relationship between Wallace and Paul Sabine? The most common answer is distant cousins. Another answer is that they shared the same great-grandfather.

However, after spending hours in various libraries throughout the country, I found some interesting facts about the family roots that didn’t agree with what others had written. How delighted I was to find out later that my findings were correct, even though, had I had the information earlier, it would have saved me a lot of time and concern.

In January 1990, Paul Ballard Sabine, Paul Sabine’s grandson, delivered some files of his father, Hale Johnson Sabine. One file contained documentation of what Hale Sabine designated as the “Sabine Roots.” Most rewarding was the fact that his account corresponded with my research on the subject matter as well as provided some additional maiden names. What was most gratifying to find in these files was additional information that eliminated a dilemma encountered early in the research.

The Wallace Sabine biography and other related documents that followed stated that Professor Sabine was a descendant of Sabines of French Huguenot origin. When researching the family tree, I had difficulties in finding the French connection. Fortunately, Hale Sabine’s file provided more in-

sight on the subject. In the file, Hale had a copy of his letter dated April 6, 1979. Apparently, copies were either sent or intended for six immediate family members and various cousins. In the letter, Hale Sabine had the following to say regarding his family roots:

You might be interested in the attached article on the Sabine roots in England before our first American ancestor William Sabine came to Rehoboth, Mass. in 1643. This seems to dispel pretty conclusively the longstanding belief in the family that we are descended from French Huguenots taking refuge in England. Instead, the line seems to be all English for quite a way back, although the exact lineage prior to William is subject to speculation in the article. It's interesting that the name had many spelling variations including the *E* on the end.

The article Hale referenced is entitled "The Surname Sabin(e), Its Origin and Development, From Circa 1200," by William Henry Waldo Sabine of London, England, reprinted from the New England Historical and Genealogical Register. From our research, some help from Hale Sabine, and this article, the Sabine family tree in America appears to be as follows:

William Sabin (no *e*) came to America in 1643. He lived in Rehoboth, Massachusetts, and fathered twenty children. He died in 1687. One of his sons, Benjamin, was born in 1646. Benjamin Sabin was first married to Sarah Polly in 1625, and they also lived in Rehoboth. They moved to Roxbury, Connecticut, in 1675. In 1676, they moved to Woodstock, Connecticut, until 1705, when they moved to Pomfret. Sarah died, and Benjamin remarried in 1678 to Sarah Parker. They had a son in 1681 named Nehemiah (1), (the bracketed numbers are added throughout to avoid confusion). Nehemiah Sabin (1) married Eliz Boyden; while living in Medfield, Massachusetts, they had five children. The fifth child, Nehemiah (2), was born September 9, 1713. Nehemiah Sabin (2) married Ruth Cooper in 1735. They had three children; the last born in 1741 they named Nehemiah (3). Nehemiah Sabin (3) married Mary Rice in 1763. They had eight children. One son they named Nehemiah Sabin (4); another son they named Elijah Sabin. Elijah Sabin was born on September 10, 1776. He became a Methodist clergyman who married and had a son, Lorenzo, born on February 28, 1803. It was Lorenzo who later changed the family name to Sabine when he became the Honorable Lorenzo Sabine, a lawyer in Boston.

Nehemiah (4) was the link to both Wallace and Paul Sabine. He was their great-grandfather. Nehemiah (4) was a pioneer preacher who moved to the Darby Plains in central Ohio. He had eleven children. Two of his children were the brothers John Fletcher Sabine and Charles Fletcher Sabine. John, Wallace's grandfather, moved to Marysville, Ohio, and was elected county auditor and married Euphemia Clement. They had a son, Hylas, on July 5, 1829. Hylas would later graduate from the Harvard Law School. Before becoming a state railroad commissioner, a state senator, and a delegate to the Republican convention, Hylas was a farmer and editor-publisher of the

Union Press and had established the town of Richwood, Ohio. Hylas married Anna Ware on October 8, 1857. She was the daughter of Jacob Reed Ware and the former Almira Wallace. They had two children Annie (Tottie) Sabine and Wallace Clement Sabine (June 13, 1868), nicknamed Tinto.

At the age of thirty-two, Wallace married Jane Downs Kelly (August 22, 1900), a physician. They had two daughters, Janet (October 23, 1903) and Ruth (July 8, 1906). Ruth died at the age of sixteen and Janet eventually married Frederick T. Ley. They had a daughter, also named Janet (2) Wallace (1925). Janet (2) married Colonel Fred Bess; he changed his name to Ley. Another account of the Janet Ley (1 & 2) story follows this segment.

The Paul Earls Sabine branch of the Sabine tree is still growing. Charles Fletcher Sabine, Paul's grandfather, married Diana Stoddard, and they had two sons, Charles Jr., Paul's father, and Lorenzo, Paul's uncle. Charles Jr. followed in his father's and grandfather's (Nehemiah 4) footsteps by joining the clergy. He was a circuit Methodist preacher in the southern Illinois area. Charles Jr. married Rebecca McLeod, and they had three sons: Paul Earls Sabine, Ralph Stoddard Sabine, and John Randal Sabine. Paul, at the age of twenty-seven, married Mabel Johnson on December 27, 1906 and they would have two sons. Paul's younger son, Richard Wallace Sabine, born February 17, 1916, would marry Sarabelle Kessler on April 29, 1939. They had two sons: John David Sabine, born November 4, 1942, and Richard Bruce Sabine, born October 10, 1947. Paul's older son, Hale Johnson Sabine, born October 23, 1909, married Majorie Alice Ballard on September 19, 1936. They had two sons: Paul Ballard Sabine, born October 22, 1938, and Charles Pruden Sabine, born June 4, 1941. Mabel Sabine died September 29, 1929. On April 16, 1938 Paul married Cornelia Corron Manley.

Janet Sabine Ley and Leo Beranek

An interesting account of the everlasting attempt to fill in the missing gaps of the Wallace Sabine legacy again comes from the renowned acoustician and Wallace Sabine historian, Leo L. Beranek. While Leo was reviewing the Riverbank files of Wallace Sabine in 1979, he received information that a Mrs. Frederic Alexander Ley (Janet) was alive and well in Philadelphia. The anticipation of interviewing Janet Sabine and filling in the Wallace Sabine gaps fulfilled a dream that Leo never thought possible. As it turned out, however, Leo's dream remained just that. He had found that Frederic Ley had remarried after his first wife (Janet Sabine) died, and by coincidence, his second wife was also named Janet. It was the latter about whom Leo had been informed. Consequently, Leo was not able to come up with any new information regarding Wallace Sabine other than Ley (pronounced "Lie") and Janet Sabine did have a daughter who they named Janet Wallace. However, Leo was told that she, too, had passed away. As it turned out this was not the case.

In 1986 Leo's quest for more information about Wallace Sabine was par-

tially fulfilled. This time he was informed that a Mrs. Janet Ley of Williamstown, Massachusetts had contributed to the Boston Symphony Orchestra fundraising drive and that she had mentioned that her grandfather was involved with the acoustics of the Boston Music Hall. Leo visited Mrs. Ley (61) and found that she possessed some material regarding Wallace Sabine that was given to her by her mother Janet (1) Wallace Ley. Although most of the material involved the documents used in the Wallace C. Sabine biography written by William Dana Orcutt, Leo was able to come up with a few new finds. Leo mentioned that Janet (2) Wallace Ley said that her grandparents pronounced Sabine as Say-bine, not Say-bin.

Leo had to explain away my puzzled look over the granddaughter's name, "Mrs. Janet Ley." Leo stated, "It's simple; her husband changed his name to Ley when they were married." Throughout the years I have known him, Leo Beranek often demonstrated an extraordinary ability to quickly resolve a dilemma by asking the appropriate questions. Sometimes, as was the case in researching the life of Wallace Sabine, Leo either had to resort to deductive or inductive reasoning to reach certain conclusions. Then, later, when new information was obtained, these conclusions were proven most accurate. Many new findings mentioned in the preceding chapters confirmed some of Leo Beranek's earlier published conclusions. Although Leo Beranek and I coauthored one article for the *Journal of the Acoustical Society of America* and jointly gave a presentation at a national ASA and local Boston chapter meeting, our professional paths rarely cross. Occasionally, because we both are members of the ASA History and Archives Committee and on the committee that organized the Sabine Centennial celebration, we do see each other at various ASA meetings. Most of our discussions through the years have occurred by mail or on the telephone and have typically centered on the Sabines. I owe Leo much gratitude for his guidance and inspiration involving the Sabine files located here at Riverbank. Most assuredly, without his support, the data in those files for all intent and purposes would never have been compiled.

A Wallace Sabine Reference Book

In 1990 I stumbled on a book in the files that had Wallace Sabine's signature on the inside cover. The book might have been one of the professor's reference books. The book is *Sound and Music, An Elementary Treatise on the Physical Constitution of Musical Sounds and Harmony*, by Sedley Taylor, M.A., former fellow of Trinity College, Cambridge. Third edition. London: MacMillan and Co. 1896.

Cornelia Sabine

I remember how surprised I was in 1980 to find out that Cornelia Sabine was alive and well in Colorado. I telephoned her and, in short order, made some

dumb comment about how alert and responsive she was to my questions. Cornelia Sabine stated, “I suspect that, although your comment is complimentary in intent, you are undoubtedly equating my age to what Paul would have been if he were still alive (101), rather than my present age of 70. You see, I was 28 years old when I married Paul, who was 59.”

I remembered at the time how I wanted to crawl under my desk and die. Many years later on the way to an ASA meeting in California, I stopped off in Colorado Springs to give her a copy of the first draft of this book. As expected, she was indeed most proper, polite, and charming. I recalled how awed I was by her astute sharpness and comprehension of everything we discussed. I automatically became unsettled and remember thinking: Please God, let this day pass without me saying anything stupid. Cornelia Sabine sensed my uneasiness in being there and knew I had strong feelings about not being a professional writer, a murderer of the English language, and having a why-me attitude in regard to writing a book about the Sabines. Somehow, Cornelia turned the entire situation around; by the time I was ready to leave, I was feeling, as they say, good all over. I recall thinking how inspiring and wonderful the day turned out. By day’s end, I wished I could have stayed in Colorado Springs a while longer. Although we both agreed that the book definitely required professional editing, I realized that Cornelia Sabine appreciated all my research efforts. In 1990, on her eightieth birthday, she visited Riverbank.

Cornelia Sabine was instrumental in getting this book edited; unfortunately, the book never reached the level of editing she desired. Cornelia Sabine felt that the book should be divided into three parts or three books about the colonel, Paul Sabine (Riverbank past), and Riverbank today.

Paul Sabine’s Hearing Problem

While visiting Cornelia Sabine, she mentioned, “You know Paul had a void in his hearing at the very high frequencies.” Just that one simple statement by Cornelia resolved a problem that had driven Riverbank personnel crazy for years. The problem was why on earth was 4000 cps (cycles per second) used rather than 4096 cps that would have been in line with the C-octave bands used at the time. The test frequencies in the 1930s were 128, 256, 512, 1024, 2048, and 4000 cps. The answer is now obvious: Paul couldn’t hear it. Cornelia’s comment clarified a statement made by Paul in a letter to Augustus Pohlman. Paul stated, “Since you realize my measurement problem above 4000 cps” At the time I first read Paul’s comment, I did not relate what he said to his hearing but rather to testing difficulties associated with perhaps either room instrumentation, humidity, or temperature.

What made the entire situation even stranger was that the other labs used the same frequencies. Obviously, Paul Sabine had some influence. By the way, today’s test frequencies also include 4000 Hz in the 1/3-octave band.

Riverbank Laboratories

A clarification and technical update of my explanation of the merits of the Wallace Sabine test chamber (Room 0) follows: To head off anyone likely to pounce on a generalization, it should be pointed out that theoretically or acoustically speaking, any room, including the Wallace Sabine Riverbank test chamber, has what is commonly referred to as its own inherent acoustical characteristics (vibrations).

Besides room volume, surface area, and shape, an acoustical test room must meet a multitude of criteria, many of which are frequency related. A test room's fundamental frequency, critical frequency, resonant frequency, and the ever-popular normal or natural frequencies are all taken into consideration when determining the acoustical properties of a test room. Then there are other frequency-related requirements that center on a test room's modal distribution or modes of vibration which include spatial distribution and averaging characteristics. Traveling waves, axial waves, oblique waves, tangent waves, standing waves, and seismic waves should all be accounted for. Then, of course, one cannot forget situations involving diffuse fields, near fields, corner and edge effects as well as peaks, dips, nodes, and — perish the thought — voids. Diffusivity, diffraction, deflectors, and rotating vanes are also theoretical areas of concern involving standard deviation and 95 percent confidence limit measurement requirements. Of course, the room's barriers (walls, floor, and ceiling) offer potential problems associated with transverse, flexural, and shear waves, which must be considered because each could limit the room's transmission loss capabilities. You also can not forget possible flanking paths or isolation characteristics to achieve acceptable ambient sound pressure levels. After all this, provisions for stringent air change, temperature, and humidity requirements are also needed to precisely define a set of measurements.

Because various acoustical test standards will address one or more problems, a laboratory must satisfy all these requirements. If they do, then and only then, can one claim to have a good acoustical test chamber. Given these parameters, the Wallace Clement Sabine Chamber (Room 0) at Riverbank is a very good test chamber. Perhaps former Riverbank manager Frank Tyzzer said it best:

The very live and highly reverberant test chamber designed by Wallace Sabine limits quite extensively any inherent or exterior structural vibrations that could reflect false information in conjunction with whatever sound absorption, sound power or sound pressure measurements are being conducted.

The Test Chamber, Past and Present

The only differences in the test chamber today from what Paul Sabine used in 1929 — other than, of course, the rotating vanes, the equipment and instru-

mentation — are the temperature and humidity conditions. Paul Sabine maintained a ten degree variance in temperature in the testing chamber — from fifty-eight to sixty-eight degrees — an admirable mark of consistency, considering the type of room-conditioning equipment available in 1929. Today, with better environmental controls, Riverbank holds the room temperature at plus or minus two degrees and the humidity plus or minus two percent.

Another slight modification is the increased room voltages. When Riverbank had to provide 440-volt service within the chamber, it was necessary to have a feed-line hole drilled through the test chamber walls. A Geneva contractor was called in for a quote and he brushed the task off as a simple job and stated a price accordingly. The next day his worker showed up and started drilling the hole. It was amazing how he managed to pick the precise location of a matrix junction for the spring steel. After two days and many drill bits, the contractor returned and stated that although his company definitely could use the work, please do him a favor by never calling him again to drill a hole in the test room walls. Now, whenever we call that contractor to do work on other things, he always quotes us an hourly rate.

The Wallace Sabine Riverbank Organ Pipes

On July 30, 1991 Riverbank employee, Brian Hornig, and student summer helper, Laron Hafenrichter of the University of Illinois were cleaning out a mountain of used insulation in the warehouse when they noticed some metal pipes. The pipes were all in a one-stack (smaller inside the larger) configuration. Brian informed me that they might have stumbled on the organ pipes that are in one of the pictures in the museum. I checked and found that the pipes were indeed the Sabine pipes. They are now in the museum.

Elmer and Elmira

In August 1941, a letter from a client asked Paul if he was going to introduce Elmer (the name given to the dummy head used for hearing tests) to Charlie McCarthy. Paul replied that he had asked Elmer how would he feel about meeting Charlie McCarthy and that without batting an eye, Elmer said, "I think that guy talks too damn much."

For one reason or another, besides their use in hearing aid tests, Elmer and his lady friend, Elmira (another dummy head), have been used throughout the years for various pranks. Each head was mounted on a pole and stand that placed the head at about a four-foot height. Both had painted faces and, on occasion, were dressed up and placed at various strategic locations throughout the laboratory. One favorite location for Elmer was in a room that doubles as a utility sink area and the ladies powder room. Because of the L-shaped design of the room, Elmer was placed in such a way that he usually wasn't noticed by the occupant until the unsuspecting person had locked the door and was seated on the toilet. The sudden awareness of what appeared to

be a man dressed in a tuxedo leering at the occupant usually resulted in a scream or a hysterical "Will you guys quit it!"

Unfortunately, Elmer met his end at IITRI. Being used for an acoustical project, he was left unattended and was accidentally knocked over by a fork lift and crushed, a most gruesome ending for a pioneer in acoustical testing. Only Elmer's picture remains and hangs proudly next to a picture of the love of his life, Elmira, in the Riverbank museum.

Every once in a while, we receive a call from someone researching early hearing tests. The caller asks if they can speak to Elmer or Elmira, and usually a lengthy explanation results.

On one occasion, Elmer and Elmira were referred to in a paper presented at an ASA meeting by a student of a nearby college as two Riverbank scientists who were quite involved with hearing aid studies during the pioneering days. Immediately, heads turned toward me with those typical facial expressions that express knowledge of an error — smirks, grins, and head shaking. I merely acknowledged their awareness with a shrug of my shoulders. I then remembered trying to guess who would be the one to tell the young speaker during the question-and-answer period afterward because historically, there are those who enjoy any opportunity to demonstrate their scientific wisdom. Oddly enough, without the respective inputs the meetings would be far less entertaining and definitely less informative.

In 1991 Elmira was used by an acoustical consultant for a field test. Fortunately, she was in style. Prior to the project, Riverbank employee Peter E. Straus had taken Elmira home, and he and his family spruced her up. Once again, Elmira stands proud in the Riverbank museum.

The Tuning Fork Facility

The Riverbank tuning fork remains today the finest of its kind in the world. What was originally the colonel's garage is now a beehive of activity and is designated as Riverbank Laboratories Inc., owned and managed by Richard A. Schlindwein. Schlindwein and his staff are responsible for the manufacture of a variety of tuning forks as well as their recently introduced choir chimes. The business is flourishing with a worldwide list of customers primarily involved in the medical, electronic equipment, music, and teaching professions. Riverbank Laboratories Inc. is an independent operation not associated with IIT Research Institute's Riverbank Acoustical Laboratory.

RAL-IITRI Past and Present Employees

The following is a list of past and present Riverbank, IIT Research Institute (IITRI), Armour Research Foundation (ARF) employee-acousticians or administrators who provided services for acoustical related activities and whose names appear in the Riverbank files. The IITRI main files were never researched, therefore acousticians and their administrators whose names

were not in the Riverbank files are not listed. The letter designations after each name are defined as follows: A, acoustician; D, Director; LD, laboratory designer; M, manager; O, owner; P, president; S, secretary; and SP, supervisor.

Abbe, Fred (A)	Alcorn, Robert (A)
Ancell, James (A)	Anderson, Albin (A)
Bellsford, Dorothy (S)	Benson, James (A)
Benson, Robert (A)	Bishop, D. E. (A)
Bonvallet, George (A)	Bulet, Richard (A)
Burkhard, Mahlon (A)	Caccavari, Cosmo (A)
Callaway, Daniel (A)	Collings, Nick (A)
Cumming, Adele (S)	Davis, Donald (A)
Dawson, Raymond (A)	Dorring, Karin T. (S)
Eisenhour, Bert (LD)	English, John (D)
Fabyan, George (O)	Fieldhouse, Irwin (D)
Fieth, Kenneth (A)	Firestone, Floyd (A)
Fitzgerald, James (A)	Graneth, John (D)
Hall, Harry (A)	Hardy, Howard (A, SP)
Hedeen, Robert (A)	Hewitt, F. G. (A)
Homans, Brian (A)	Hornig, Brian (A)
Howard, Robert (A)	Howes, Maurice (D)
Hrdina, Donald J. (A)	Hruska, Gail (A)
Huntley, Ralph (A, M)	Jensen, Cora (S)
Johnson, Kenneth (A, M)	Johnson, Larry (A)
Jones, Kenneth (A)	Jones, Randy (A)
Joyce, Richard (A)	Karplus, Henry (A)
Kerfoot, Robert (A)	Kopec, John (A, SP, M)
Kranz, Fred (A)	Krowzack, Frank (A)
Lawre, W. E. (A)	Leedy, Hal (D)
Lowe, Michael (A)	Lowry, William (A)
Lubman, David (A)	McAuliffe, D. R. (A)
McKee, Keith (D)	Mintz, F. (A)
Morrison, David (D, P)	Moschandreas, Demetrios (D)
Mundy, Arline (S)	Norman, Renny (A, M)
Olson, Elmer (A)	Pernet, David F. (A)
Perrone, Diane (A, S)	Pohlman, Augustus (A)
Potter, S. M. (A, SP)	Prusa, James (A)
Purcell, Ernest (A)	Raelson, Verner J. (A)
Ramer, Luther (A, M)	Reiffel, Leonard (D)
Richards, Roy (A)	Ronk, Don (A)
Sabine, Hale (A)	Sabine, Paul (A, M)
Sabine, Wallace (A, LD)	Sanders, Guy J. (A, SP)
Schechter, Howard (A)	Schramm, Scott (A, M)
Schulman, Steve (A)	Schultz, Elmer (D)
Schwartzbart, H. (A)	Scott, John (P)
Siekman, Bill (A, M)	Simmilink, Andrew (A)

Sperry, William (A, M)	Stapleton, Robert (A)
Straus, Peter (A)	Swenson, John (A)
Tinberg, Elizabeth (S)	Tung, Vincent (A)
Tyzzer, Franklin (A, M, LD)	Valela, Richard (A)
Valentino, Anthony (D, VP)	Viergutz, Owen (A, M)
Victor, Dean (A)	Vogt, Arthur (M)
Warren, Robert (D)	Whymark, Roy (A)
Wilkomer, R. (A)	Williams, Don (A)
Winchotke, Horst (A)	Wright, Nobert (A)
Zedonis, David (A)	Zedonis, Donald (A)

Riverbank Management Designations

The Riverbank director designation remained after Paul Sabine's retirement in 1947. Although the ARF, renamed in 1962 the IIT Research Institute (IITRI), took over the facility and had a different title structure involving president, vice president, director, manager, supervisor, and so on, the duties of a director entailed a much wider spectrum of research endeavors. The title of the individual in charge of the Riverbank operations changed from director to manager to acoustical liaison engineer to chief of acoustical testing to supervisor and back to manager as it is currently.

A list of the individuals responsible for day-to-day operations, with their pertinent years bracketed and their respective titles follows. In some cases both the on-site RAL and the IITRI-Chicago person responsible are included, with the latest title first.

George Fabyan	1918–1936	RAL Owner-President
Wallace Clement Sabine	1918–1919	RAL Director Designee-Designer
Paul Earls Sabine	1919–1947	RAL Director-Dean
Luther Ramer	1947–1953	RAL Director-Physicist
Ralph Huntley	1953–1963	RAL Director-Manager-Supervisor
Frank Tyzzer	1963–1966	RAL Director-Manager-Physicist
William Siekman	1966–1972	RAL Director-Manager Research Engineer
Kenneth Johnson	1972–1974	IITRI Assistant Research Director
Renny Norman	1974–1981	IITRI Manager-RAL Manager
Owen Viergutz	1982–1984	IITRI Manager
Scott Schramm	1985	IITRI Manager
Arthur Vogt	1985–1993	IITRI Manager-IITRI Supervisor
John Kopec	1974–1996	RAL Manager-Supervisor Chief Liaison Engineer

Note: At various times between 1972 and 1982, Keith McKee, doubled as IITRI director and RAL manager and filled in as the corporate person responsible for RAL operations until a new manager could be found. There were a few other times in Riverbank's history that either Haldon Leedy, Irwin Fieldhouse, and John Granath did likewise.

Riverbank Secretaries

What appeared to be a simple task at first — establishing who were the secretaries during the various periods of the Riverbank story — turned into a major undertaking. Much of the early correspondence came out on stationery with just the word Riverbank, which involved the entire estate, or on Fabyan Bliss Corporation letterhead. Then, in 1923, the name Riverbank was incorporated and covered both the tuning fork and acoustical laboratories. When the colonel died in 1936, the Riverbank trustees also required secretarial services. In 1947, RAL became a separate identity under ARF (later IITRI). And, until the 1950s, various Riverbank secretaries provided services for any one or more of the three facilities.

One of our best sources was Elizabeth Tinberg, who left Riverbank in 1953. At the time of her departure, she was providing secretarial services for the trustees, the tuning fork facility, and the acoustical laboratory. Before leaving she trained her replacement, but she was not able to recall the trainee's name, only that the trainee did not stay long. The names of Anna M. Van Haelst and Miss Paterson appear in the files, and perhaps one of them was the trainee.

The succession of secretaries since the 1920s for the Riverbank trustees, Riverbank Laboratories Inc., and the Riverbank Acoustical Laboratories appears to be as follows: At first, Belle Cumming handled much of the colonel's secretarial needs. Then, when the scientific activities picked up, Cora Jensen was brought in. Cora and Belle shared the secretarial duties for all the scientific operations, including the code work, greenhouses, and so on. When Cora Jensen retired in the early 1940s Elizabeth Tinberg was hired. Besides being Paul Sabine's and later Luke Ramer's secretary, Tinberg took on the additional secretarial chores for Riverbank Inc. and was, for a time, the only Riverbank secretary, particularly after Belle Cumming's death in an auto-train accident. Tinberg remained until 1953, and although the name of the woman she trained is uncertain, Darlene Lund took over the secretarial tasks for the Riverbank trustees and the tuning fork operations and she was followed by Marjorie Hahn. Eventually, Lois Williams replaced Marjorie. In 1987, Lois died and was replaced by Deborah (Debbie) Franklin. In 1992, Mariam Schlindwein took over the secretarial duties for the tuning fork operations.

In 1953 Arline Mundy started. She was hired by ARF/IITRI on a part-time basis as secretary for RAL. Arline became secretary for Ralph Huntley followed by managers Frank Tyzzer, William (Bill) Siekman, Howard Johnson, Renny Norman, Keith McKee, and Owen Viergutz. Arline remained until 1982 when she retired as Mrs. Riverbank. Before leaving she trained her replacement, Diane (Haase) Perrone. Diane was secretary for RAL managers / supervisors Owen Viergutz, Scott Schramm, Arthur Vogt, and yours truly.

Later, Diane became interested in the testing portion of RAL operations

and became the first female to be accredited by the Department of Commerce's National Voluntary Laboratory Accreditation Program (NVLAP) Department to do acoustical testing. Because of her involvement in acoustical testing, Diane relinquished her secretarial duties to Karin Tallroth Doring who was hired in March 1990. Karin was previously employed by the Geneva Chamber of Commerce.

There have been a series of secretarial romances at Riverbank, Inc. and RAL (IITRI). Cora Jensen married RAL Manager Frank Tyzzer, Majorie Hahn married RAL Manager Bill Siekman. Lois Williams was married to RAL employee (Mr. Riverbank) Don Williams, and Diane (Haase) Perrone is married to Riverbank Inc.'s former foreman, Jerry Perrone.

Riverbank Personnel: Past and Present

The following material expands on the information and stories already given about the Riverbank employees.

Elizabeth Tinberg

After leaving Riverbank, Elizabeth Tinberg remained in Geneva, Illinois, until she passed away on August 13, 1992. She was involved with church and community activities. She did a lot of Swedish-to-English or vice versa translation. In a previous discussion with her about Belle Cumming, Tinberg recalled that the woman (Mrs. Harriet Fowler) driving the car when she and Miss Cumming were hit by a train at the Geneva crossing was a former American Red Cross nurse-driver assigned to General George Patton's army. Many Genevans thought how ironic that Belle Cumming survived driving during the war but soon after returning was killed in an auto accident in Geneva. I remembered thinking at the time that what makes the story even more ironic is that General George Patton also survived the war to be killed afterward in an auto accident near a small town.

Arline Mundy

In late 1982, after thirty years of service, Mrs. Riverbank, Arline Mundy, retired. She was a favorite of many Riverbank clients. Arline was one of those individuals who could type faster than the typewriter could respond. While typing, she loved to whistle. One day while at my desk, I found that I was having quite a difficult time humming along with her rendition of *As Time Goes By*. Suddenly, I realized the problem and mentioned to Don Williams who was seated at his desk, "Hey Don — did you realize that Arline whistles off key?" Slowly Don turned and while looking over the top of his glasses said, "For almost thirty years, I been putting up with that *&%%\$# whistle. Why do you think I do most of my writing in the control room?"

Arline's voice, however, has become something of an acoustical reference.

In Riverbank's acoustic test data exists a graph of two male voices and one female voice reading street names (station stops) as a subway train approaches the station platform. Well, that was my doing for a project to develop an adequate speaker system for subway stations. Because I had noticed that our voices peaked at different third-octave bands, I taped the voices of Arline, Don, and mine for the experiment. The end result showed that the noise of the subway trains completely masked Don's voice and my voice, but Arline's voice could still be understood by the individuals standing on the platform.

When Arline retired, one of her gifts was a buzzer sound box. Before our new paging system was installed, each employee was paged by a code of shorts or longs or a combination of both buzzes. When an incoming telephone call occurred, we could all hear the ring, and it became automatic to pause to hear who would be paged. After a tolerable time, if no buzz occurred, we would proceed with our work. Because Arline was so popular with our clients, she often would pass the time of day with them and there could be a long delay between the telephone ring and the paging buzz. Often was the case that just when you reached the top of a ladder or headed into a no-phone area, your paging buzz would sound. How we hated that buzzer. When we commented to Arline about the length of time between the telephone rings and the page buzzes she would say, "You don't expect me to be rude with our clients do you?" Like I said, we sure hated that buzzer.

Today Arline and her husband Bill have become world travelers and have given much of their time showing pictures or talking about their travels to senior citizen groups. The Christmas displays at Arline's home are annual classics that on occasion make the local newspapers.

Lois Williams

On January 20, 1987 Lois Williams passed away. Secretary to Riverbank Inc. for many years, she suddenly succumbed to a cancer that had been detected only ten months earlier but thought to have been held in check. As with other great Riverbank women, her passing brought grief and sadness to the staff of both laboratories.

Lois just wasn't around any longer to accompany Don on all those trips they had planned to do together in their newly purchased mobile home

Ralph Huntley Interview

Many that once were in control of Riverbank were interviewed to gather information about Riverbank's past and the Sabines. During such an interview, former Riverbank Manager Ralph Huntley mentioned that he was a physics student at Harvard while Professor Wallace Sabine was there. Instantly, Ralph was slammed with a deluge of questions concerning his confrontations, experiences, and associations with the renowned professor. The onslaught of questions came to an abrupt halt after it was realized that Ralph

wasn't given time to respond to the first question. Ralph took a deep breath and in his deliberate and direct manner stated, "Young man, I deeply appreciate your overwhelming enthusiasm, but you must fully realize that at the time, Professor Wallace Sabine was the Dean of the Harvard Physics Department, and I was but a lowly freshman; thus, any general discussion between us, as was the case, was most unlikely."

After leaving Riverbank, Ralph Huntley went on to help develop the Cedar Knolls Acoustical Laboratory. He later retired in Florida. On October 20, 1995 at the age of 95, Ralph Huntley passed away.

Roger Ames

Although Roger was unaware of it at the time, his observance of the Riverbank tuning fork operation that day involving Nelle Fabyan and the foreman, as noted in Chapter 3, was a preview of where he would be some fifteen years later and would remain until he retired in 1986. Like Don Williams, Roger Ames is called on from time to time to do specific tasks at Riverbank. In 1987, Roger returned to run the tuning fork operation when the regular manager was laid up. Through the years as a Riverbank Inc. employee, Roger worked for Bert Eisenhour senior and junior, as well as the current manager, Richard Schlindwein, and is credited with inventing the Ames tube.

Carl A. Anderson and the Choralcelo

In 1980 Don Williams received a letter from former Riverbank employee, Carl A. Anderson, explaining the merits of the controversial Riverbank instrument, the choralcelo. Other accounts referred to the choralcelo as the Bacon levitation device, but Anderson attributes the instrument to Wallace Sabine in an article that appeared in *Voxcatoe*, in July 1980:

"Choralcelo" is the name of a musical instrument not commonly found in a dictionary, and is slowly being lost in the encyclopedia. Having the unique pleasure of seeing and hearing such a rare instrument some years ago, here is a brief description.

Basically, the console resembles a theater pipe organ console, with 2 manuals and about 32 tabs. The mechanics of the system includes a bank of approximately 48 signal motor generators of various sizes. All motors are of the synchronous type. The generators are of different frequencies corresponding to the orchestra pitch of the musical scale. When a key is played, the selected frequency from a generator is relayed to an electromagnet on the musical instrument selected by the top tab. Most of the instruments are of the string type, violin, piano, harp, cello, etc. The excited electromagnet then set the selected string in vibration producing the tone of that particular instrument. Other component parts included drums, marimba, etc. By vibrating strings electromagnetically, the musical tones are void of the hammer and pluck sounds.

The Choralcelo musical instrument seen and heard was presumably invented by the late Prof. Wallace C. Sabine, Acoustical Physicist of Harvard U. and was

installed in the early 1900s in the Riverbank Acoustical Lab, Geneva Ill. The lab was owned by Col. George Fabyan. The Choralcello was dismantled in the early 1940s shortly after the death of Col. Fabyan.

Peter E. Straus

Peter Edward Straus came to the lab in 1984 as a part-time employee. On April 1, 1985 he became a permanent and full-time Riverbank employee. Don Williams took him under his wing as his replacement so that he could retire. Peter not only fulfilled the rigorous demands of doing maintenance and testing but became Riverbank's computer whiz. Strangely, in the early days, Paul E. Sabine would initial the tests P.E.S. One day in 1990, a client called and asked, "Just how old is Pete anyway? I recently saw some 1930s Riverbank data with his initials on it. I surely thought he was much younger than that when I met him."

Another story involving Peter happened just about the time a TV mini-series entitled, *Rich Man, Poor Man* was aired. It starred the actor Peter Strauss. A woman from IITRI's Publicity Department called and asked, "From time to time I understand that noted individuals come to Riverbank, is that true?"

Feeling a little devilish, I responded, "Oh sure. In fact right now in the control room are Peter Straus, Jerry Lewis, and Michael Jackson." That was true, but I somehow failed to mention that Pete was not the actor, and the other two were the actual names of two individuals representing RAL clients. Anyway, there was a pause on her end; then she said, "You're kidding, aren't you?"

Just then Don Williams walked in, and I said, "Hey, guess what? Do you know the country and western singer Don Williams?" "Yes," she replied. "Well, it's your lucky day. Don Williams just walked in." I then went on, "Hi, Mr. Williams. Say! I'm sure you know who's standing in the control room. Will you please introduce yourself and inform the young lady on the line who those gentlemen are?" Don picked up on my ploy and responded with, "Hello, this is Don Williams. To whom do I have the pleasure of speaking?" After explaining who she was, Don said, "Well let me see, oh yes, I see Pete Straus, Michael Jackson and Jerry Lewis. Apparently they are looking at some sound data or something. Well, I'm somewhat in a rush. It's been a pleasure. Here's Johnny." He handed the phone back to me, and after listening to a whole bunch of chatter between the young woman and the people near her, I realized that to prevent a mass exodus from IITRI Chicago to Riverbank, I'd better explain.

For some reason, she never called me again about who's at Riverbank. Heck, I only told her the truth. I just don't understand why she would be suspect about what I might say — do you?

Roy Richards

Roy Richards started at Riverbank in 1946. Later, Roy would become part of Towne, Richards, and Chaudiere, consultants in sound and vibration in Seattle, Washington. Roy contributed material and information that he had on file for use in these writings, and in fact, one of his more recent letters, dated February 25, 1988, mentioned, "Acoustic Levitation has finally arrived — some 70 years after Colonel Fabyan's machine. See pages 496–501 in the February 1988 *ASA Journal*. Of course, it only takes SPL's of 160 dB to achieve it."

Roy Richards provided copies of material that he felt might provide additional input. Included, was a page from the July 1949 issue of *The Scientific Monthly* that was sent to Roy from Paul Sabine, which read:

PSEUDO-SONNETS FOR SENESCENT SCIENTISTS

I

Why must the poet always tune his lyre
To sing of lovers' griefs, of passion's glow;
Why must his song be laden with desire
Or in a minor mode be filled with woe?
Must mossy banks and softly rippling streams
Or daring deeds or melancholy death
Run full the gamut of the poets' themes
And claim the voicings of the poets' breath?
Soft moonlight filtering through the whispering leaves,
Fair swaying daffodils on river's brim,
The vines that clamber over thatched caves,
Ice crystals sparkling on the birch tree's limbs;
The smoke that, through the frosty twilight air,
Suggests the comforts of the toiler's cot —
All these the humble poet sings with care.
These are the counters of the poet's thought.

II

This lurid world of transient loveliness
Awakes the poet's soul to lyric song,
But Nature in her sphinxlike quietness
Serenely weaves enchantment yet more strong
And stirs the strivings of the questioning mind.
For he who seeks the wherefore and the why,
Not satisfied with Beauty, looks behind
Its surface where still deeper meanings lie.
On him fair Nature smiles or frowns in vain,
For, manlike, quite regardless of her mood,
He knows, alike in either joy or pain,
She's always eager to be understood.

So, not beguiled by her soft blandishments,
 He would disclose what Nature would conceal.
 With eager questions of experiment
 He seeks her cherished secrets to reveal.

III

With oh what cunning skill and patient care
 He fashions scientific traps designed
 To catch elusive Nature unaware
 And make her captive to his ruthless mind.
 With meters, balances and microscope
 He tries to pierce the center of her thought.
 "By measurement to know" — this is his hope
 That Truth in nets of numbers may be caught.
 In terms of matter, motion, time, and space,
 Electrons, atoms, molecules, and force,
 He bravely seeks her tortuous ways to trace,
 And mathematically to plot her course
 He catalogues her uniformities
 And proudly nominates them "Nature's Laws,"
 Neglecting her vexatious vagaries;
 He'll not allow effect without cause.

IV

Persistently he questions, till, forsooth,
 Discouraged with the never-ending quest.
 He wonders: "Does she always speak the truth?
 Let Nature take her course, I'll take a rest."
 Surprised, that for the time she's not pursued,
 Dame Nature drops her mask of seeming guile,
 Turns to her weary son in melting mood,
 Bestows the favor of her rarest smile.
 "You must not take me for a simpleton
 And, fretful, charge that you have been misled.
 I answer truly but, my foolish one,
 My answers still must be interpreted.
 I'm but the outer aspect of your mind.
 Consider well. Though I admit 'tis true
 I give half answers, yet you still must find
 The other half, my dauntless son, in you."
 Renewed, still eager, but a whit less bold
 Humbly he feels new truths within him stir.
 His colleagues smile. "He's growing old.
 Our scientist has turned philosopher."

Paul E. Sabine
 1109 North Weber St.
 Colorado Springs, Colorado.

Signed with the handwritten words, "To my good friend, Roy Richards from P.E.S."

RAL Staff Award

In September 1989, RAL staff members Brian Hornig, John Kopec, Diane Perrone, and Peter Straus received the IITRI President's Award for meritorious achievements. Besides an individualized congratulatory letter sent to each of us from then IITRI president, David L. Morrison, the interoffice memorandum announcing the awards stated the following: "Superior performance and industrial revenue growth through teamwork on acoustical testing." During the awards luncheon, Morrison introduced the staff by stating, "When IITRI visitors are asked, of all the IITRI facilities, which impressed you the most? The answer at the top of the list is Riverbank." In 1994 John Kopec received the award. In 1996, the RAL staff, now consisting of Karin Dorrington, Peter Straus, Dean Victor, and John Kopec, were once again recipients of this award. Thus John Kopec became the first IITRI employee to receive this award three times.

Geneva, Illinois

Today, Geneva, Illinois and Riverbank complement each other very well.

Geneva is one of the most pleasant places located within the Chicago and vicinity portion of the state map or, as noted elsewhere, within the hypothetical commuter boundaries of Chicago.

Through the years, Geneva has managed to maintain its heritage and traditional ways. Noticeably serene, quaint, and picturesque, Geneva is in great demand by those hoping to find a place of residence in this highly regarded, respectable Fox Valley area.

Every summer Geneva hosts one of the state's more enjoyable happenings, "Swedish Days." Visitors from far and near make their annual trek to this gala event. For an entire week, bargain prices, unusual items, and great food are offered. As well as a myriad of festival-related events, there are contests, sights, parades, and other forms of entertainment. It is a delight for young and old alike. In 1985, Geneva celebrated its sesquicentennial with Jerry Perrone (senior) as the grand marshal.

Throughout the year, Geneva is a favorite place for many of Riverbank's clients. Clients often return for more testing accompanied by business associates, friends, and family they persuaded to come along just to see the place. Besides their tests, usually the first order of the day is a Riverbank tour. Around noon, off they go to their respective favorite restaurant. After periodically checking on their tests, it's off to the various specialty shops located throughout Geneva.

Some of Geneva's shops are designed in the Swedish tradition where a house serves as private residence (home) and/or as a place of business. For

example, The Little Traveler, when approached, appears to be just one very large house containing many rooms. After entering, the patron soon observes that each room contains a specific category of items. Many items fall in the rare or unique category and the prices range accordingly. If one proceeds through each room and follows the same process at the next shop and so on ... and so on, the hours spent shopping add up quickly.

On returning to the lab, the clients and their quests usually bombard the staff with questions and favorable comments regarding the many places they visited or heard about. When departing, many express how much they enjoyed coming here and how both Geneva and Riverbank offer their own one-of-a-kind uniqueness in their respective areas. Because these same visitors express their views of what they saw to others, in time, they create more business. Thus, the Fabyan legend continues to grow, which might be good for business too. In any case, the colonel is still involved with the goings-on at Riverbank and in Geneva. Thank you, colonel wherever you are.

ASA History

One only has to attend an ASA meeting and play musical chairs as you jump from one session to another to fulfill your personal and professional needs. The tremendous scope of topics being covered is unbelievable. Oftentimes it is difficult to choose between concurrent sessions covering related topics of interest. On some occasions, joint sessions are scheduled to avoid such hassles. However, it becomes an individual challenge to fulfill one's own itinerary at the meetings. Other conflicts increase the challenge even more, such as technical committee meetings; technical demonstrations; various tours; special sessions; plenary sessions; commemorative sessions; award sessions; luncheons; product displays; and, of course, meetings with those within your own particular categories of interest.

The ASA meetings are acoustical spectacles that occur twice a year in various parts of the country. While each location has representatives of the society who put meetings together under the auspices of the national ASA officers and executive council, each of the local area's contingents, in trying to outdo one another, has continually improved the quality and quantity of each successive ASA meeting.

ASA Meetings Past and Present

The ASA meetings through the years were similar to prestigious social gatherings, especially when it came to the attire, which in the beginning was fairly formal. The meetings had an air of refinement, almost snobbish in character. Today, however, the dress code at the meetings has changed considerably. The elders maintain traditional attire but some of the new bloods are creating

a more relaxed and casual atmosphere. For those in between, that is, those who appreciate the tradition but enjoy and prefer the casual attire, there is the problem of deciding which sessions are definitely suit and tie; which are sports coat and tie; which are no tie sessions; and, for the more daring, which are the decorated T-shirt and sweatshirt sessions. The only reason the issue of ASA attire is brought up is that whenever the discussion centers on the transition of the meetings through the years, the most obvious change as observed by the old-timers is the dress.

JASA

The Journal of the Acoustical Society of America (JASA) is another example of the conflict between holding with tradition and moving toward something more indicative of today. It is often asked is why the journal does not ever print more practical material or, at least, a joke, a cartoon, or silly pictures, anything other than the highly technical, academic- and mathematic-oriented text that has been part of JASA since its beginning.

The same question was put to long-time ASA Fellow Leo L. Beranek. Leo, who is a master of brevity, replied that actually an editor of JASA tried it once. He included a poem that offended some members and a picture of me, then president of the ASA "shooting the stars," that is, the photo was so captioned and showed me drinking from an elevated beer bottle at an ASA picnic.

Shortly thereafter then Editor Floyd Firestone dutifully, some say under pressure, turned in his resignation. It wasn't until many years later, when honored with a medal, did Firestone, also a former ASA fellow and president, ever return to an ASA meeting.

ASA History and Archives Committee

Fortunately, there are some within the ASA that are making certain that the history of the various acoustical disciplines will be documented. In 1988, the ASA formed the Committee on Archives and History. The original members were William J. Cavanaugh, chairman; Leo L. Beranek; Malcolm J. Crocker; Allen L. Cudworth; Betty H. Goodfriend; Carleen M. Hutchins; and John W. Kopec. The ex-officio members were ASA President W. Dixon Ward, ASA Vice-President Eric E. Unger, JASA Editor-in-Chief Daniel W. Martin, ASA Treasurer Robert T. Beyer, and ASA Secretary Murray Strasberg. In 1990, I became the chairman of the committee.

From the first two meetings in 1988, it was decided that this newly formed committee would first compile an inventory of the location and types of archival and historical material of interest to the society and then develop strategies for maintaining a meaningful historical collection for the multi-dimensional discipline of acoustics. For example, RAL is the location for the museum on architectural acoustics.

Final Recognition of Colonel Fabyan's Pioneering Efforts in Cryptology

In 1993 the National Security Council officially recognized Colonel George Fabyan for his pioneering efforts in cryptanalysis and cryptology training during World War I. The events leading to this award started in 1991 when I responded to a letter of inquiry from Louis Kruh, an editor for *Cryptologia*, a quarterly journal devoted to cryptology. After a few follow-up telephone conversations, Kruh decided that it would be best if he came to Riverbank to see what I, as well as what others in the Fox Valley area, had about the colonel and codes. When Kruh arrived, I gave him a tour of the laboratory and our museum. While we were in the museum, I surprised him with some letters and artifacts I had stored on codes and Colonel Fabyan. Kruh commented on the incredible significance that the letters and artifacts meant to the history of cryptology. He provided me with a most fascinating and incredible account of each item. Shortly after, Kruh began contacting various individuals at the National Security Agency (NSA). About one year later, I received a letter from Vice-Admiral J. M. McConnell, the director of the NSA:

According to information brought to our attention by Mr. Louis Krush of Merriam, New York, you hold letters from the Secretary of State and others, applauding the service of Colonel George Fabyan and his Riverbank staff at the advent of World War I. Attention was drawn especially to the November 1917 letter from Colonel Van Deman, the "father of military intelligence," which contained these words: "The services you have rendered are not to be estimated in terms of money, and it is a source of regret to me that I am wholly unable to devise a method by which the sense of obligation, by the Intelligence Section in particular, may be fittingly evidenced." The subject carefully avoided in the letter was that of cryptanalysis and cryptologic training, now among the responsibilities of this federal agency. Noting that the seventy-fifth anniversary year coincided with the fortieth anniversary of this agency, Mr. Kruh suggested that we might undertake to afford recognition to the memory of Colonel Fabyan and his Riverbank staff.

We are therefore delighted to convey to you, as curator of the Riverbank historical collection and memorabilia, a plaque recognizing these volunteer citizen-cryptologists of 1917 and their assistance to the government at a time of critical need. I trust that you will find an appropriate place to display it, and will bring this belated recognition to the attention of the various organizations and friends of the Fabyans and Riverbank.

The plaque that accompanied the letter reads as follows:

National Security Agency
United States of America

TO THE MEMORY OF GEORGE FABYAN FROM A GRATEFUL GOVERNMENT

In recognition of the voluntary and confidential service rendered by Colonel Fabyan and his Riverbank Laboratories in the sensitive areas of cryptanalysis

and cryptologic training during a critical time of national need on the eve of America's entry into World War I.

Presented to mark the seventy-fifth anniversary by the National Security Agency, United States Department of Defense, 1917-1992.

I am very proud of the fact that responding to Kruh's letter, which was originally sent to someone else and later passed on to me, turned out even better than I had hoped. At the time, all I wanted was recognition of the colonel's contribution to cryptology by an authority on the subject. Fortunately, I provided enough information to persuade Kruh to come to Riverbank. We, at Riverbank, as well as many others in the Geneva, Illinois, area are grateful to Louis Kruh. Were it not for him, the colonel would not have received rightful recognition for his achievements in cryptography. To learn more about the award, obtain a copy of the October 1993 *Cryptologia*. Kruh provides in-depth coverage. In the same issue, Kruh wrote "Reviews and Things Cryptologic," which includes an update about Sir Francis Bacon.

Closing Comments

Originally started in 1978, the story of the Sabines at Riverbank was put on a shelf, so to speak, because of the discovery of twelve Wallace Sabine notebooks in the Riverbank library followed by my discovery of the professor's files in a closet. Details of the notebooks were documented by Leo Beranek. Originally, I had compiled the files (in total) in a nonpublished paper which was accepted by the Harvard Archives. Later, Leo Beranek and I authored and published an article for *JASA* covering the highlights of these files. In 1980, I returned to writing the story of the three Sabines and Colonel Fabyan and continued the arduous task of researching information about all four of them.

Through the years many distinguished ASA members have assisted me in various areas centered on architectural acoustics. I often tried to convince myself that researching the files was no problem but I realized that putting it into a publishable format really was not my forté. However, members of the ASA urged me on with the understanding that it would be easier if I compiled the information because I had access to the files; afterward, others could polish it up. Accordingly I continued, although at times I felt that I had a strong case for professional harassment against those who urged me on. Yet when all is said and done, I am honored to say that regardless of limitations in writing technique, this document is dedicated to all those ASA members who are concerned about the history of architectural acoustics. I do hope this book does justice to the Sabines, architectural acoustics, Riverbank, and the ASA.

— John W. Kopec

Bibliography

- ASTM Committee E33. 1994. *Annual Book of ASTM Standards 04.06*. Philadelphia: The American Society for Testing and Materials.: 125, 686.
- Aurora *Daily Beacon-News* 1939. "Buy Fabyan Estate for Park." 14 December.
- Bamford, James. 1982. *The Puzzle Palace*. Boston: Houghton Mifflin Co.
- Beck, Joan. 1995. "Decoding years of propaganda." *Chicago Tribune*, 11 May, sec. 1:31.
- Beranek, Leo L. 1942. "Acoustical Impedance of Porous Material." *Journal of the Acoustical Society of America*, 13(3):248.
- Beranek, Leo L. 1960. *Noise Reduction*. New York: McGraw-Hill Book Company Inc.
- Beranek, Leo L. 1962. *Music Acoustics & Architecture*. New York: John Wiley & Sons.
- Beranek, Leo L. 1971. *Noise and Vibration Control*. New York: McGraw-Hill.
- Beranek, Leo L. 1977. "The Notebooks of Wallace Clement Sabine." *Journal of the Acoustical Society of America*, 61(3):629.
- Beranek, Leo L., and John W. Kopec. 1981. "Wallace C. Sabine, Acoustical Consultant." *Journal of the Acoustical Society of America*, 69(1):1.
- Beranek, Leo L. 1985. "Wallace Clement Sabine and Acoustics." *Physics Today*, 38(2):44.
- Beranek, Leo L. 1993. "Wallace Clement Sabine." *Echoes*, 3(1)1.
- Beranek, Leo L. 1994. "Acoustical Consultation: Brief History Before 1960." *Proceedings Wallace Clement Sabine Centennial Symposium*, :15. Woodbury, NY.: Acoustical Society of America.
- Bolger, Molly. 1985. "Our Own Mad Scientist." St Charles, Ill.: *Chronicle Enterpriser*, 24 July: 6.
- Boyden, Sarah. 1960. "George Fabyan Eccentric Genius.": *Chicago Sun Times*, 25 Sept.
- Budrean, George. 1959. "Estate Days of Glory Gone; Beauty Stays, Col. Fabyan Home Now is Forest Preserve." *Chicago Tribune*, 28 June.
- Buckingham, E. 1925. "Theory and Interpretation of Experiments on the Transmission of Sound Through Partition Walls." Washington D.C.: No.S-506, *Scientific Papers of the Bureau of Standards*, 20:193.
- Cavanaugh, William J., Richard H. Talaske, and Ewart A. Wetherill. 1982. *Halls for Music Performance*. New York: American Institute of Physics.
- Chicago Tribune*. 1950. "Fabyan Estate as Fabled as Its Onetime Squire." 7 September.
- Chiles, James R. 1987. "Breaking Codes was this Couple's Lifetime Career." *Smithsonian*, June: 128.

- Chrisler V. L., and W. F. Snyder. 1929. "Transmission of Sound Through Wall and Floor Structures." Research Paper No. 48, *Journal of the National Bureau of Standards*, 2:51.
- Clark, Ronald. 1977. *The Man Who Broke Purple*. Boston: Little, Brown and Company.
- Cook, Richard K. 1977. "The History of American Acoustics: Introductory Comments." *Journal of the Acoustical Society of America*, 61(2):249.
- Cornish, Sabryna. 1995. "Preservation Partners New Fabyan Villa Manager." *The Republican*, 6 July: 8.
- Crain, Dorothy. 1916. *Ciphers for the Little Folks*. Geneva, Ill.: Riverbank Laboratories Educational Department.
- Crain, Dorothy. 1918. *Method Pour Enseigner du Chiffer Bilitere*. Geneva, Ill.: Riverbank Laboratories.
- Egan, David M. 1988. *Architectural Acoustics*. New York: McGraw-Hill.
- Ehresmann, Julia M., editor. 1985. *Geneva, Illinois, A History of Its Times and Places*, First and Sesquicentennial Commemorative Edition. Geneva, Ill.: Public Library District.
- Fabyan, George. 1900. *What I Know about the Future of Cotton and Domestic Goods*. Chicago, Ill., 2nd. ed.
- Fabyan, George. 1916. *The Greatest Work of Sir Francis Bacon*. Geneva, Ill.: Riverbank Laboratories Press: 1.
- Firestone, Floyd A. 1953. Book Review. "Atoms, Men and God by Paul Sabine." *Journal Acoustical Society of America*, 25(5):1019.
- Fletcher, Harvey. 1939. "The Acoustical Society of America. Its Aims and Trends." *Journal Acoustical Society of America*, 11(2):13.
- Fowler, Leonard. 1942. "Two Gentleman of Geneva Reap Rewards of Industry." *The Fox Valley Mirror*, 9(1):14.
- Friedman, William F. 1922. *The Index of Coincidence and its Applications in Cryptanalysis*. Washington, D.C. United States Government Printing Office, (199):1.
- Hall, Edwin H. 1919. "Wallace Clement Sabine." *The Harvard Graduates Magazine* :1, Cambridge, Mass.: Harvard Press.
- Harris, Cyril M. 1957. *Handbook of Noise Control*. New York: McGraw-Hill.
- Haugh, Delores. 1971. "Rovelstad, Sculptor of History." *Chicago Tribune* 14 May, Womans sec.:1.
- Hedeen, Robert. 1981. *Compendium of Materials for Noise Control*. Cincinnati, Ohio: DHEW National Institute for Occupation, Safety and Health (NIOSH):80(116).
- Hitt, Parker Colonel. 1935. *The A B C of Secret Writing*. New York: Puck Products Company.
- Holbrook, Marj. 1965. "They Listen to the Sounds of Silence." *Aurora, Ill.: Beacon News*, 14 September, family leisure sec.:1.
- Holbrook, Marj. 1968. "Fabyan Windmill, Dutch Treat That Isn't From Holland at all." *Aurora, Ill.: Beacon News*, 16 June, family leisure sec.:1.
- Holbrook, Marj. 1977. "In Remembrance of a Green Thumb, Japanese-style." *Aurora, Ill.: Beacon News*, 12 June.
- Howard, Nancy. 1987. "Lightning bolt boon for Fabyan." *St. Charles, Ill.: St. Charles, Batavia, Geneva Chronicle*, 11 March.
- Hunt, F. V. 1939. "The Absorption Coefficient Problem." *Journal of the Acoustical Society of America*, 11(2):11

- Hunt, F. V. 1954. Book Review. "Atoms, Men and God by Paul Sabine." *Journal Acoustical Society of America*, 26(1):113.
- Innis, P. B., and Walter Dean Innis. 1973. *Gold in the Blue Ridge*. Washington, D.C.: Devon Publishing Company.
- Izenour, George C. 1994. "The Career of Wallace Clement Sabine in the Context of Twenty-five Centuries of Auditorium Design in the Western World." *Proceedings Wallace Clement Sabine Centennial Symposium*, :3. Woodbury, NY.: Acoustical Society of America.
- Jack, William A., and Robert T. Beyer. 1969. "Wallace Sabine Award to Hale J. Sabine." *Journal of the Acoustical Society of America*, 45(2):527.
- JASA, Editor. 1942. "Charles C. Potwin." *Acoustical Society News: Journal of the Acoustical Society of America*. 13(3):319.
- Kahn, David. 1967. *The Codebreakers*. Boston: Macmillan.
- Kopec, John W. 1982. "Variations in Sound Transmission on Steel Studded, Gypsum Walls." *Sound and Vibration*, June:10.
- Kopec, John W. 1987. "Overcoming Hurdles of Single Number Acoustical Ratings." *Tile Industry News*, 21(1):9. Reprinted *Sun/Coast Architect/Builder*, 53(2):W2.
- Kopec, John W. 1994. "The Sabines at Riverbank." *Proceedings Wallace Clement Sabine Centennial Symposium*, :25. Woodbury, NY.: Acoustical Society of America.
- Knudsen, Vern O., and Cyril M. Harris. 1978. *Acoustical Designing in Architecture*. New York: American Institute of Physics.
- Kranz, Fred W. 1970. "Early History of Riverbank Acoustical Laboratories." *Journal of the Acoustical Society of America*, 49(2 p1):381.
- Kruh, Louis. 1979. "The Day the Friedmans had a Typo in Their Photo." *Cryptologia*, 3(4):236
- Kruh, Louis. 1993. "A Cryptological Travelogue: Riverbank — 1992." *Cryptologia*, 27(1):80.
- Kruh, Louis. 1993. "Reviews and Things Cryptologic." *Cryptologia*, 27(4):378.
- Kruh, Louis. 1993. 1993. "Riverbank's 1917 Cryptologic Contributions to the United States Officially Recognized as National Security Agency Adopts Editor's Suggestion." *Cryptologia*, 27(4):403.
- Kryger, Susan M. 1987. "The Far From Average Fabyan Forest Preserve." *Illinois Magazine*, March-April.
- Larson, Darlene, and Laura Hiebert. 1992. "The Fabyan Legacy." *Friends of Fabyan Publication*, 3rd. Revision. Aurora, Ill.: Valley Instant Printing.
- Lescarbourea, Austin C. 1923. "A Small Private Laboratory." *Scientific American*, Sept.:154.
- Lindahl, Robert, and Hale J. Sabine. 1940. "Measurement of Impact Sound Transmission Through Floors." *Journal of the Acoustical Society of America*, 11(4):383.
- Logsdon, Ron. 1982. "Anthropologist Unravels Truth About Fabyan." *Beacon News*, 7 Febr., sec. A:2.
- London, A. 1949. "Transmission of Reverberant Sound Through Single Walls." Research paper RP1998, *Journal of Research of the National Bureau of Standards*, 42:605.
- Lyman, Theodore. 1936. "An Appreciation of Professor Sabine." *Journal of the Acoustical Society of America*, 7(4):241.
- McWaid, Maureen. 1993. "Code Breaking on the Banks of the Fox." *Old Fox River*, 1(6):3.
- Miller, Dayton C. 1936. "The Spirit and Service of Science." *The Science Press*, 84 (2179):297.
- Miller, Jayne. 1939. "Shakespeare Mystery Key in Fabyan Books." *Herald*. 6 August.

- "The New Hotel Aurora of Aurora, Illinois" 1917. New York, *Hotel Monthly* 25(293):70.
- Newton, David. 1987. "The Fabyan's Fabulous Geneva Retreat." *Historic Illinois*, 10(4):8.
- Northwood, Thomas D. 1977. *Architectural Acoustics*. Stroudsburg, Penn.: Dowden, Hutchinson & Ross, Inc.
- Orcutt, William Dana. 1923. *Wallace Clement Sabine A Study In Achievement, A Biography*. Norwood, Mass.: Plimpton Press.
- Parker, Sybil P. 1989. *Dictionary of Scientific and Technical Terms*. New York: McGraw-Hill.
- Pearson, Ruth S. 1974. "Tea House Ceremony, Quiet Ponds to Return Serenity to Fabyan's." *Chronicle*, 14 August, sec. 2:1.
- Pierce, Allan D. 1989. *Acoustics an Introduction to its Physical Principles and Application*. Woodbury, New York: Acoustical Society of America.
- Pierotti, Anne. 1984. "Recalling the Days of Col. Fabyan." St. Charles, Ill.: *The Chronicle Enterpriser*, 25 January.
- Potwin, C. C., and J. P. Maxfield. 1939. "A Modern Concept of Acoustical Design." *Journal of the Acoustical Society of America*, 11(1):48.
- Quennell, Peter. 1963. *Shakespeare a Biography*. Cleveland: The World Publishing Company.
- Rossing, Thomas D. 1983. *The Science of Sound*. Reading, Mass.: Addison-Wesley Publishing Company.
- Russell, Francis. 1981. "A Pioneer in Cryptology." *The Secret War, World War II*, 29:78. Chicago: Time Life Books, Inc.
- Sabine, Hale J. 1940. "What Acoustical Treatment will not do." Abstract. *Journal of the Acoustical Society of America*, 11(3):375.
- Sabine, Hale J. 1940. "Absorption of Noise in Ventilating Ducts." *Journal of the Acoustical Society of America*, 12(1):53.
- Sabine, Hale J. 1941. *Less Noise Better Hearing*. Chicago: The Celotex Corporation.
- Sabine, Hale J. 1942. "Notes on Acoustical Impedance Measurements." *Journal of the Acoustical Society of America*, 14(2):131.
- Sabine, Hale J., and Allen R. Wilson. 1943. "The Application of Sound Absorption to Factory Noise Problems." *Journal of the Acoustical Society of America*, 15(1):27.
- Sabine, Hale J. 1947. "Sound Absorption and Impedance of Acoustical Materials." *Journal of the Society of Motion Picture Engineers*, 49(3):262.
- Sabine, Hale J. 1950. "Review of the Absorption Coefficient Problem." *Journal of the Acoustical Society of America*, 22(3):387.
- Sabine, Hale J. 1951. "The Measurement of Sound Absorption." ASTM publication #123.
- Sabine, Hale J. 1951. "The Use of Acoustical Materials in the Control of Industrial Noise." *Acoustical Research Engineer*, Celotex Corp. :27.
- Sabine, Hale J. 1952. "Sound and Its Behavior." *Noise*, The University of Michigan Press, :1.
- Sabine, Hale J. 1953. "Room Acoustics." *Transactions of the I.R.E.* :4.
- Sabine, Hale J. 1954. "Manufacture and Distribution of Acoustical Materials Over the Past 25 years." *Journal of the Acoustical Society of America*, 26(5):657.
- Sabine, Hale J. 1956. "An Apparatus for Measuring Air-Flow Resistance of Acoustical Materials." American Society for Testing Materials, *ASTM Bulletin*, 211(1):29.
- Sabine, Hale J. 1957. "Acoustical Materials." *Handbook of Noise Control*. (C. Harris Ed), 18:1 New York: McGraw-Hill.

- Sabine, Hale J. 1959. "Acoustical Design Criteria for Sandwich Panels." *Sandwich Panel Design Criteria*, 798:23.
- Sabine, Hale J. 1960. "Effect of Painting on Sound Transmission Loss of Lightweight Concrete Block Partitions." *Noise Control*, 62:6.
- Sabine, Hale J. 1961. "Sound Propagation Near the Earth's Surface as Influenced by Weather Conditions." Report 57-353, part 4.: Wright Air Development Center.
- Sabine, Hale J. 1961. "Measurement of Sound Transmission Through Door Seals." Report, Physics Research Division, Armour Research Foundation.
- Sabine, Hale J. 1965. "Measurement and Reduction of Refrigerator Noise." *Journal American Society Heating Refrigerating Air Cond. Engineering*, Jan:1.
- Sabine, Hale J. 1977. "Building Acoustics in America to 1930," *Journal of the Acoustical Society of America*, 61(2):255.
- Sabine, Paul E. 1919. "The Lifework of the Late Wallace C. Sabine, An Appreciation." *The American Architect*, 116(2271):1.
- Sabine, Paul E. 1919. "The Wallace Sabine Laboratory of Acoustics, Geneva, Ill." *The American Architect*, 116(2275):1.
- Sabine, Paul E. 1920. "Photo-Electric Potentials for Extremely Short Wave-Lengths." *Physical Review*, 16(6):1.
- Sabine, Paul E. 1920. "Transmission of Sound through Doors and Windows." *The American Architect — Architectural Acoustics*, 118(2327):102.
- Sabine, Paul E. 1920. "The Absorption of Sound by Rigid Walls." *Physical Review*, 16(6):514.
- Sabine, Paul E. 1921. "Architectural Acoustics — The Transmission of Sound Through Flexible Materials — Part I." *The American Architect*, 120(2377):215.
- Sabine, Paul E. 1921. "Architectural Acoustics — The Transmission of Sound Through Flexible Materials — Part II." *The American Architect*.
- Sabine, Paul E. 1921. "The Efficiency of Some Artificial Aids to Hearing." *The Laryngoscope*, Reprint.
- Sabine, Paul E. 1922. "Research in Applied Acoustics at the Wallace Clement Sabine Laboratory." *Transactions of the Illinois Academy of Science*, 15:26.
- Sabine, Paul E. 1922. "Architectural Acoustics I — The Nature and Reduction of Office Noises." *The American Architect*, 121(2394):441.
- Sabine, Paul E. 1922. "Architectural Acoustics II — The Nature and Reduction of Office Noises." *The American Architect*, 121(2395):487.
- Sabine, Paul E. 1922. "Architectural Acoustics III — The Nature and Reduction of Office Noises." *The American Architect*, 121(2396):527.
- Sabine, Paul E. 1923. "Architectural Acoustics — Transmission of Sound by Masonry Partitions." *The American Architect*.
- Sabine, Paul E. 1923. "Acoustical Power of Certain Sound Sources in Absolute Units." *Physical Review*, 3:303.
- Sabine, Paul E. 1924. "Architectural Acoustics — Acoustics in Auditorium Design." *The American Architect*.
- Sabine, Paul E. 1926. "Architectural Acoustics — Sound Insulation by Double Partitions." *Armour Engineering*, May:131.
- Sabine, Paul E. 1926. "Architectural Acoustics — Transmission and Absorption of Sound by Wood Stud Partitions." *The American Architect*.

- Sabine, Paul E. 1928. "The Acoustics of Sound Recording Rooms." *Transactions of The Society of Motion Picture Engineers*, 12(35):809.
- Sabine, Paul E. 1929. "The Measurement of Sound Absorption Coefficients." *Journal of the Franklin Institute*, 207(3):1
- Sabine, Paul E. 1929. "Architectural Acoustics — Sound Absorption Coefficients of Materials." *The American Architect*, 135(2570):745.
- Sabine, Paul E. 1929. "Transmission, Reflection, Reverberation, and Absorption of Sound." *International Critical Tables*, 6:458.
- Sabine, Paul E. 1930. "Transmission of Sound By Walls." *Journal of the Acoustical Society of America*, 1(2):181.
- Sabine, Paul E. 1930. "Acoustics of the Chicago Civic Opera House." *The Architectural Forum*, 4:599.
- Sabine, Paul E. 1931. "Sound Transmission Coefficients and Reduction Factors." *Journal of the Acoustical Society of America*, II(4):506.
- Sabine, Paul E. 1931. "A Critical Study of the Precision of Measurement of Absorption Coefficients by Reverberation Methods." *Journal of the Acoustical Society of America*, III(1):139.
- Sabine, Paul E. 1932. *Acoustics and Architecture*, New York: McGraw-Hill.
- Sabine, Paul E. 1932. "Weight as a Determining Factor in Sound Transmission." *Journal of the Acoustical Society of America*, 4(1):38.
- Sabine, Paul E. 1932. "Acoustics in Theater Design." *The Architectural Forum*, Sept:261.
- Sabine, Paul E. 1933. "Sound Control in Buildings of the Future." *Civil Engineering*, 3(8):436.
- Sabine, Paul E. 1934. "Recent Developments in Architectural Acoustics." *Journal of the Franklin Institute*, 217(4):443.
- Sabine, Paul E. 1935. "What is Measured in Sound Absorption Measurements." *Journal of the Acoustical Society of America*, 6(4):239.
- Sabine, Paul E. 1936. "The Beginnings of Architectural Acoustics." *Journal of the Acoustical Society of America*, 7(4):242.
- Sabine, Paul E. 1938. "Effects of Cylindrical Pillars in a Reverberation Chamber." *Journal of the Acoustical Society of America*, 10(1):1.
- Sabine, Paul E. 1938. "Absorption Effects in Sound Transmission Measurements." *Journal of the Acoustical Society of America*, 10(2):102.
- Sabine, Paul E. 1939. "Architectural Acoustics: Its Past and Its Possibilities." *Journal of the Acoustical Society of America*, 11(1):21.
- Sabine, Paul E. 1939. "Measurement of Sound Absorption Coefficients from the Viewpoint of the Testing Laboratory." *Journal of the Acoustical Society of America*, 11(1):41.
- Sabine, Paul E. 1940. "Control of Sound in Buildings." *Design Trends — Architectural Record*, 87(1):67.
- Sabine, Paul E. 1940. "Council on Physical Therapy — Acceptance Tests of Hearing Aids." *Journal of the American Medical Association*, 115:1633.
- Sabine, Paul E. 1940. "Acoustical Engineer Comments." Bankers Life Building, Des Moines, Iowa, :48,66,67.
- Sabine, Paul E. 1940. "Theory and Use of Architectural Materials." *Acoustical Material Association*, 7(39-b):4.

- Sabine, Paul E. 1941. "Specific Normal Impedances and Sound Absorption Coefficients of Material." *Journal of the Acoustical Society of America*, 12(3):317.
- Sabine, Paul E. 1942. "The Acoustical Society and Noise Abatement." *Journal of the Acoustical Society of America*, 13(3):207.
- Sabine, Paul E. 1942. "On Estimating the Percentage Loss of Useful Hearing." *Transactions of the American Academy of Ophthalmology and Otolaryngology*, 46(1):179.
- Sabine, Paul E. 1942. "Noise Abatement." *Hospital Management*, May.
- Sabine, Paul E. 1942. "On the Acoustical Properties of Small Cavities." *Journal of the Acoustical Society of America*, 14(1):74.
- Sabine, Paul E. 1944. "The Problem of Industrial Noise." *American Journal of Public Health*, 34(3):265.
- Sabine, Paul E. 1944. "Acoustical Amplification by Hearing Aids." *Journal of the Acoustical Society of America*, 16(1):38.
- Sabine, Paul E., and L. G. Ramer. 1948. "Absorption — Frequency Characteristics of Plywood Panels." *Journal of the Acoustical Society of America*, 20(3):267.
- Sabine, Paul E. 1948. "Reduce the Noise Menace." *Bankers Monthly*, Page 40.
- Sabine, Paul E. 1949. "Pseudo-Sonnets for Senescent Scientists." *The Scientific Monthly*, 69(1).
- Sabine, Paul E. 1951. "The Acoustics of the Remodeled House and Senate Chambers of the National Capitol." *Journal of the Acoustical Society of America*, 24(2):121.
- Sabine, Paul E. 1953. *Atoms, Men and God*. New York: Philosophical Library.
- Sabine, Paul E. 1955. "Making Acoustical Virtues out of Architectural Necessities." *Journal of the Acoustical Society of America*, 27(3):497.
- Sabine, Paul E. N.d. "The American Way." Unpublished Book MS. Geneva, Ill.: Riverbank Acoustical Laboratories.
- Sabine, Paul E. N.d. "Discussion on the Collected Papers of Wallace Sabine." Unpublished Paper. Geneva Ill.: Riverbank Acoustical Laboratories.
- Sabine, Paul E. N.d. "Modern Science and the Will to Believe." Unpublished Book MS. Geneva Ill.: Riverbank Acoustical Laboratories.
- Sabine, Wallace Clement. 1900. "Architectural Acoustics — Part 1. — Reverberation." :5.
- Sabine, Wallace Clement. 1915. "Architectural Acoustics." *Journal of the Franklin Institute*, Reprint J. B. Lippincott Company.
- Sabine, Wallace Clement. 1910. "Architectural Acoustics." *Engineering Record*, June:1.
- Sabine, Wallace Clement. 1927. *Collected Papers on Acoustics*. Edited by Theodore Lyman. Cambridge Mass., Harvard University Press.
- Sabine, Wallace Clement. 1993. *Collected Papers on Acoustics*. Los Altos, Calif.: Peninsula Publishing.
- Seigenthaler, Katherine. 1987. "Out of Success Came Legends of Col. Fabyan." *Chicago Tribune*, 10 August.
- Shankland, Robert S. 1977. "Architectural Acoustics in America to 1930." *Journal of the Acoustical Society of America*, 61(2):250.
- Richards, Roy L. 1958. "New Airborne Sound Transmission Loss Measuring Facility at Riverbank." *Journal of the Acoustical Society of America*, 30(11):999.
- Thompson, Emily. 1994 "The Pre-Sabinites: Architectural Acoustics in Nineteenth-Century America. *Proceedings Wallace Clement Sabine Centennial Symposium*. 29. Woodbury, New

York: Acoustical Society of America.

Todd, Mabel Elsworth. N.d. *The Thinking Body*. Brooklyn, New York: Dance Horizons.

Tyzzar, F., and H. A. Leedy. 1954. "Advances Since 1929 in Method of Testing Acoustical Performance of Acoustical Materials." *Journal of the Acoustical Society of America*, 26(5):651.

Waterfall, Wallace. 1939. "Events leading to the formation of the Acoustical Society of America." *Journal of the Acoustical Society of America*, 11(2):11.

Watson, F. R. 1923. *Acoustics of Buildings*. New York: John Wiley & Sons; revised edition , 1941.

Watson, F. R. 1939. "The Journal of the Acoustical Society of America." *Journal of the Acoustical Society of America*, 11(2):15.

Watson, Pat. 1951. "Bacon's Ghost Haunts Equipment at Riverbank Acoustical Laboratory." *ARF News*, 3(7):4

Way, Peter. 1977. *Codes and Ciphers — The Encyclopedia of Espionage*. London: Aldus Books Limited, Danbury Press.

Wetherill, Ewart A. 1994. "Sabines First Experiment-Analysis of the Acoustics of the Fogg Art Museum Lecture Room." *Proceedings Wallace Clement Sabine Centennial Symposium*. 33. Woodbury, New York: Acoustical Society of America.

Wiggins, DuBois K. N.d. "Deciphering Secrets is a Fascinating Occupation." N.p.

Wilson, Ann. 1988. "Historic Fabyan Forest Preserve." Geneva *Quarterly Magazine*, Fall.

Wisby, Gary. 1984. "Fabyan's Fabled Legacy." Chicago *Sun Times*, 1 July.

Young, Robert W. 1994. "Sound Absorption Coefficients of Two Kinds, Per Wallace Clement Sabine." *Proceedings Wallace Clement Sabine Centennial Symposium*. 49. Woodbury, New York: Acoustical Society of America.

Other References Used in this Book

Riverbank files dating from 1900 to 1995 provided a considerable amount of information used in this book. The files are labelled as Wallace Sabine (1900-1918), Paul Sabine (1919-1947), Luther Ramer (1947-1953), Ralph Huntley (1953-1963), and Frank Tyzzar (1963-1966). There are also many Riverbank files involving individuals who were involved with either the IIT Research Institute (IITRI, 1963-1995), Armour Research Foundation (ARF, 1936-1962), and Riverbank Acoustical Laboratories (RAL, 1918-1995). Most of the latter are filed by name.

Composed in Times Roman,
a digital font created by
Adobe Systems, Inc. from the
font family originally designed by
the Monotype Corporation for the
London Times.

Printed and bound by
Braun-Brumfield, Inc.,
Ann Arbor, Michigan,
in an edition of
1,000 copies

