

The 1940s

National Noise Abatement, War Research, and a Sabine Retires

Hard as it might be to imagine, Paul Sabine's time during the 1940s and beyond was divided among even more endeavors than ever before. In addition to the usual teaching, research and testing, technical writing, and consulting, he also became involved with the war effort; the development of hearing aids; and the formation of an organization dedicated to noise abatement — an undertaking that proved to be one of the most political of his long career.

Paul Sabine began the 1940s by writing an article for the January 1940 issue of *The Architectural Record* (the Design Trends section), entitled "Control of Sound in Buildings." He described the problem of taking absorption data obtained in the laboratory on a small sample and applying it directly to a large-scale application. He broadened the problems by involving buildings that have multiple sources generating frequencies not involved in laboratory tests of the time.

Sabine went on to list a variety of new materials and applications being developed that could be used to control noise put out by sources such as heating, ventilation, and air conditioning (HVAC) equipment. Although the onset of World War II eventually put the development of these materials and applications on hold until the late 1940s, the article both predicted things to come in architectural acoustics and illustrated why Sabine was courted by the organizers of the National Noise Abatement Council (NNAC), a group that sought to establish a widespread and unified effort to solve the problem of noise in this country.

Although Paul Sabine's dedication to the NNAC was made evident by the

many letters on file at Riverbank, it is impossible to know if, at the time of his initial commitment to the organization, whether he knew how convoluted and difficult the task would become because of World War II and political elections as well as a series of confrontations with the Acoustical Society of American (ASA).

Heeding the advice of colleagues in the American Materials Association (AMA), Paul Sabine applied for membership to the advisory committee of the newly established NNAC. On September 26, 1940, he received a letter from F. Edgar McGee, secretary pro tem for the organization, stating that he was delighted with Sabine's interest and explaining the objectives of the NNAC, which centered primarily around the advent of Noise Abatement Week, October 21–26. McGee also included a list of participating companies and individuals and ended the letter by reaffirming how much Paul Sabine's services would be appreciated and used.

In the beginning, the NNAC held its meetings the day ahead of the annual ASA sessions. Because Sabine was a fellow and past president of the ASA and had recently become a member of the Advisory Committee of the NNAC, he hoped to establish a platform of unification, whereupon the NNAC and the ASA could jointly combat problems of noise pollution.

By July 1941, the NNAC was gaining recognition through its small news bulletin. Local committees, including the Chicago Noise Reduction Council, were forming across the country. In order for any of these committees to propose programs, they needed recognition by the ASA. The ASA had much more expertise and experience in establishing and administering programs of this kind.

Recognizing this need, C. P. Little, president of the NNAC, and Wallace Waterfall, secretary of the ASA, approached the executive council of the ASA and proposed the two groups combine their efforts. Shortly thereafter, Edward C. Wentz, president of the ASA, appointed Paul Sabine as liaison between the organizations. In July 1941, he began preparing his presentation, which would be given at the October ASA meeting in New York, by sending out a questionnaire to the membership. In response to the question, Do you think the Acoustical Society should actively support a nation-wide anti-noise campaign? 178 responded yes, and 10 said no; the remaining 12 voted in the affirmative but expressed some reservations about the importance of noise abatement with U.S. involvement in the war in Europe an almost forgone conclusion.

On October 20, 1941, Paul Sabine presented his findings and recommendations to the executive council of the ASA, formally requesting a vote on the following three referenda: (1) The appointment of a standing committee on national noise abatement to promote and coordinate the ASA's efforts for less noise and to cooperate with the NNAC; (2) the formal endorsement by the executive council of the ASA of the noise-abatement program of the NNAC; and (3) the authorization of the use of the ASA name in noise-abate-

ment publicity and in appeals for the support of national, state, and municipal authorities in promoting the movement for less noise.

The executive council voted only for the first referenda and the matter was held in abeyance pending further information and considerations.

On October 31, Paul Sabine wrote F. Edgar McGee stating his deep concern for the lack of progress by the ASA, although he was fully aware of their reasons. In an earlier discussion with Wentz, Paul was informed that the ASA executive committee members were hesitant to sponsor the NNAC program because they felt that the organization had too many political and commercial attachments. The committee's primary concern was to avoid the possibility of being accused of having any conflicts of interests and, in turn, endangering the credibility of the ASA.

Although the merger was, at least, temporarily halted, the NNAC realized the effort Paul Sabine had made and, on November 11, 1941, granted him honorary membership. Sabine acknowledged his appreciation to the group and added, "I hope to be able to do my share in the splendid work which the council has inaugurated."

As part of this membership, Sabine was asked to investigate a number of problems including the noise created by airplanes flying over Manhattan, a complaint lodged by E. H. Peabody, president of the League for Less Noise in New York. Sabine advised Peabody that "because of the problems associated with the world situation, the most advisable and immediate solution to try to enforce is to ask for specific flight paths and approaches at higher altitudes." Another problem, this one registered by Clinton Jones of Lenox, Massachusetts, asked for legislation to define "an adequate muffler equipment for commercial vehicles." Paul Sabine started to collect data on this matter but was eventually stalemated because of the vagueness of the term adequate.

At this same time, prodded by McGee's constant reminders, Sabine started to consider candidates for a standing committee to further explore the ASA-NNAC connection. Immediately, he suggested Haldon Leedy of Chicago and H. A. Erf of Cleveland, Ohio. Wallace Waterfall and Burris Myers were also mentioned as was Harold Shugart of Los Angeles. Sabine wanted his committee to be geographically distributed, but he knew that besides having a qualified committee, he would also need a common cause to unite acousticians nationally. As it turned out, he was able to unite them internationally.

A letter from Charles W. Glover, an acoustical consultant from London and the publisher of *Practical Acoustics for the Contractor*, provided the catalyst Sabine was seeking. In his letter, Glover stated that there would be an enormous need for noise abatement and that their Noise Abatement League, which had been formed by Lord Horder in the autumn of 1933, was working on various programs — including the unreasonable use of loudspeakers, horns, gramophones, street musicians, and pneumatic drills — even while the war was on. Glover also cited programs on early milk deliveries (solved

by putting rubber tires on the carts and rubber shoes on the ponies and using nonglass containers), the use of train whistles, car regulations, and legislation on the misuse of wireless operators. He ended by stating that his organization "would be pleased to cooperate with the council of nation wide abatement noise in the USA by exchange of literature, technical and legal data, and that I look personally forward to a long and happy association in a campaign for less noise."

Sabine immediately distributed details of the letter, particularly the British offer of cooperation, and Glover was put on the NNAC active mailing list. A cablegram from England followed: "Paul Sabine — ASA Whole hearted co-operation. Noise Abatement League, London. Glover, Member."

Realizing that the time was right, Sabine began contacting candidates for his standing committee. In some cases, acousticians contacted him either to volunteer their services or to nominate a colleague. Harold Shugart and Arthur Nye of the University of Southern California volunteered to supply data, and both suggested that Vern Knudsen of University of California at Los Angeles be on the committee. Because Sabine had already considered Knudsen, he wrote him to ask for his help and ended the correspondence with, "Of course the main problem will be quieting the big noise started by Hitler-Jap and company." Knudsen replied, "Yes, the war effort has to be first and foremost. However, you have such a manner of asking that I cannot refuse you. I will be glad to participate. First though the nuisance in Germany and Japan; fortunately Italy apparently already is pretty quiet."

On February 2, 1942, Paul Sabine submitted the five names of his standing committee to E. C. Wentz: Harold Burriss-Myers, Stevens Institute, Hoboken, New Jersey; H. A. Erf, Cleveland, Ohio; Haldon Leedy, Armour Research Foundation, Chicago; V. O. Knudsen, University of California at Los Angeles; and ex officio member, Wallace Waterfall.

On February 9, Wentz replied, "Congratulations on selecting such a capable group of men and I will see to it that the ASA will take this matter up at the Ann Arbor meeting May 15th and 16th. You will have to present a total update of your committee's findings." He continued, "The atmosphere will be more favorable in Ann Arbor than it was in New York, if for no other reason than the fact that here we seem to have become quite calloused to noises which in many other places are thought to be above the threshold of feeling." He charged Sabine with the additional chore of ensuring that pertinent information from and about the committee be presented at Ann Arbor and stated that he had informed Floyd Firestone, who was chairman of the program committee, about his and Sabine's intentions. To help implement the process, Wentz officially recognized the standing committee.

Then, a second breakthrough occurred. The U. S. government, through its Office of Civil Defense, provided a project, requiring a joint effort, for obtaining all available information about sirens. With a great deal of assistance

from Leedy, Sabine organized a plan to involve acousticians nationally. He wrote Firestone and had him send, with the ASA meeting notices, an open invitation for all available members to cooperate on providing any information or obtaining any data on sirens.

Although the government's proposed project provided the momentum his movement required, Sabine continued to lobby for it, first by asking McGee to provide copies of the NNAC booklet, *Let's Stop Noise* to be given out at the Ann Arbor meeting and then by writing seven steps for proposals for action by the Noise Abatement Committee of the ASA, which he presented at the Ann Arbor meeting.

On May 22, 1942, the ASA officially endorsed the movement for the abatement of excessive noise so that air-raid sirens could be heard as a civilian defense measure. The organization also requested that the American Standards Association establish a committee to formulate standards pertaining to noise abatement. By the end of May 1942, fifty cities had organized committees for noise abatement. On August 5, 1943, Sabine was made an honorary member of the Noise Reduction Council of greater Chicago. Also, as under his leadership of the NNAC, the organization won the Group 1 Achievement Award in 1943, 1944, and 1945.²⁹

In retrospect, it is interesting to note the parallels between the formation of the ASA and that of the NNAC. As mentioned in an earlier chapter, the ASA's roots can be traced to a small group of scientists, the Acoustical Committee of the National Research Council, who first convened in 1920. Some twenty years later, another small committee pioneered the creation of the National Noise Abatement Council, which later became part of the ASA. In both cases, these founding committees had the same chairman: Paul E. Sabine of Riverbank.³⁰

The War Years and the Winding Down of a Scientific Career

The affairs of the NNAC and the ASA became less important in light of what Vern Knudsen referred to as "the nuisance in Germany and Japan." By May 1942, U.S. efforts in both theaters were escalating, and it became increasingly apparent that civilian activities would have to take a back seat to any projects the government requested.

Immediately following the December 7, 1941 attack on Pearl Harbor, Paul Sabine contacted the U.S. government, offering Riverbank as a site for acoustical testing of any variety deemed appropriate by any branch of the military.³¹ Rather than take up the offer, however, the government invited Sabine to come to Harvard University to join a team of scientists who were engaged in submarine detection research at the Underwater Sound Laborato-

ry, directed by F. V. Hunt. By the summer of 1942, Sabine had been granted a leave of absence from the Geneva lab and was in Cambridge, Massachusetts, hard at work.

In a congratulatory letter, Riverbank trustee Maulsby Forrest promised that he would take care of all administrative and financial problems while Sabine was away. He also mentioned that the entire board of trustees was proud of both Sabine and Luke Ramer, who was Paul's research assistant, and who had already been called back into the service. Forrest stated, too, that Belle Cumming and Elizabeth Tinberg, Paul Sabine's secretary, would also contribute their efforts and that they all would welcome Paul and Luke back when the shooting was over.

There were many inquiries at Riverbank during the war years, to which Elizabeth Tinberg either responded with a form letter ("Paul Sabine is on a leave of absence from the laboratory doing war research at Harvard University and your letter will be forwarded to him"), or she sent the correspondence directly to Sabine in Massachusetts. Riverbank did not, however, close down entirely, and on occasion, tests were conducted at the facility. In most cases, testing was done under the guidance of technician Robert Kerfoot or, if necessary, Hale Sabine, who would come in from the Celotex Corporation.³² As far as any official acoustical tests done by Paul Sabine, none bore his signature or initials from mid-June 1942 to January 1946.

When he went off to do his part at Harvard, Paul Sabine was 63 years old, but his age did nothing to lessen his enthusiasm for his country's involvement in the war, diminish his mental capacities, or slow him down physically. From various accounts, it appears that it was the younger Harvard assistants who had difficulty keeping up with Paul Sabine rather than the converse.³³

This same energy and enthusiasm was just as evident in Sabine's other endeavors as well, chiefly his renewed interest in hearing loss and the development of hearing aids. The war put an end to his efforts in this field, but between 1940 and his departure for Harvard in 1942, Paul Sabine devoted a great deal of time to the problem.

Although he had done some previous work on hearing during the 1920s and had published "The Efficiency of Some Artificial Aids to Hearing" in 1921, Sabine's files after this date indicated he had diverted most of his research efforts to architectural acoustics. However, around 1938, he returned to hearing research with a newfound fervor. Perhaps it was in part that he, himself, was no longer responding to certain high frequencies — the ring of a telephone, for example, was almost inaudible to him — and perhaps in part that his wife, Cornelia, had a hearing impairment. He corresponded with a number of doctors about his wife's problem — describing it as an "otosclerotic case with a 50 dB loss in the frequency range of 512–4096 cycles" and explaining that she used a carbon-type boneconducting instrument to en-

hance her hearing. Eventually, an operation was performed by Dr. George Shambaugh Jr. at Wesley Hospital, Chicago. The surgery was a success, resulting in a 33 dB increase in his wife's hearing.

Because electronic hearing aids were appearing on the market at an increasing rate and because his involvement with the National Noise Abatement Council dealt with hearing loss, Sabine began investigating and evaluating the various products. From the beginning, he tried to convince others that hearing aid tests were essential. To this end, he wrote an article for the Council on Physical Therapy that was published in the November 9, 1940, issue of the *Journal of the American Medical Association* entitled "Acceptance Tests of Hearing Aids." The article addressed two important questions: What type of instrument and what particular make of instrument will give me most nearly normal hearing? Does the particular instrument which best meets my hearing needs have serious defects of a practical nature that would make its purchase inadvisable?³⁴ Sabine was always careful not to make general statements about hearing aids, and he would never answer the question, What is the best hearing aid? because he thought that doing so was a good deal like trying to answer the question, What is the best pair of glasses?

Sabine also corresponded with various doctors during the early 1940s about a report entitled "Tentative Standard Procedure for Evaluating the Percentage of Hearing Loss in Medical Legal Cases." The report was proposed by a committee of consultants on audiometers and hearing aids. Sabine derived a weighted audiogram, and the method he devised — referred to as the "consultant's method" — was accepted by the American Medical Association, although not without a good deal of discussion among physicians in the organization, especially within the Council of Physical Therapy.

Because of this project Paul Sabine found himself corresponding with other doctors on follow-up projects, including a simplified audiometric and hearing-loss chart. He also assisted in the development of acoustically weighing audiograms and designed equipment for otological and audiometric testing.

His most extensive correspondence was with an otologist, Dr. Augustus Grote Pohlman, with whom he had a relationship that was both professional and personal. The two of them bantered back and forth in their letters, yet they were both serious about their interest in the ability of people to hear properly. In one letter, Paul Sabine admonished Dr. Pohlman's colleagues "who would rather operate when a hearing aid would do the job," stating that if it were a case of a man losing all his teeth, it would stand to reason that "there would be no use for him to acquire dentures because a miniature food chopper would be even more successful and less expensive."

Like so many projects started at Riverbank before World War II, Sabine's work in hearing aid and hearing-loss research was put on hold until after his return. At the same time, inquiries about the lab's ability to conduct testing for a variety of potential clients did not slow down much during the war. In

fact, in 1942 before Sabine even left for Harvard and his submarine detection work there, one forward-looking customer, the manager of the Louisville Memorial Auditorium, wrote asking for Paul Sabine's consulting services in the future, heading his request "Post War Planning" — either a sign of great foresight or, perhaps, a reaction to the recent U.S. naval victory in the Battle of Midway. In any respect, the manager wanted Sabine's guarantee that his auditorium would have results similar to the Metropolitan Museum of Arts Auditorium, as reported in the *New York World Telegram* a year and a half earlier. Although he was unable to undertake the Louisville job at the time, Sabine did consult with the administrators of the auditorium in 1945, and the desired results were achieved.

By January 1945, inquiries for testing at Riverbank were coming at a faster rate. Simpson Logging, U.S. Gypsum, Celotex, Johns Manville, Armstrong Cork, Great Lakes Steel, Maizewood Insulation, plus many others were requesting tests on their products. One letter came from the government of Portugal, asking for absorption measurements on cork. The responding letter had, by this time, been revised and instead of announcing that the laboratory was closed, there was a more hopeful note:

Thank you very much for your letter, which was received today. The members of our acoustical staff are as yet on leave of absence doing war research in the East and we, therefore, are unable to do any work for you at this time. We hope to be able to re-open this division of our laboratories within the next few months. Our plans are contingent upon the ending of the war in Europe and the need for the members of our staff to continue their research.

We regret that we cannot be of more assistance at the present time, but hope that we may be of service to you in the future.

As the letter indicated, the end of the war seemed imminent and Paul Sabine's focus in response to the situation began to shift back to Riverbank. He contacted General Radio to have his sound-level meter calibrated and to complain about the noisy electron tubes used in the meter. He suggested an updated circuit to eliminate such noise. He also contacted E. F. McDonald at Zenith Radio regarding the quality of hearing aids and suggested that the devices could now more easily be tuned to match the critical frequencies of a subject's ear.

Sabine had hoped to return to Riverbank in June 1945, but it was October before he finally arrived. It took three months for him and Luke Ramer to update the equipment and begin testing again. In a letter to the AMA Sabine wrote, "The number of things that can happen to an electronic set up must be experienced to be fully appreciated." When the lab was ready in January 1946, it ended a three-and-a-half-year period during which Riverbank was — except for a few emergency-type tests conducted by either Bob Kerfoot or Hale Sabine — essentially closed.

On January 25, 1946, Paul Sabine lamented that for all the good it was supposed to do, modern technology was not all it was cracked up to be:

Loving all the problems we are having with this so called state of the art equipment. Proper filtering, oscillator stabilizing, microphone inconsistencies, gave us many headaches until we finally got things right. I suspect our future expenditures will correspond to what ever piece of new equipment suddenly appears on the market. Oh for those good old Man-in-the-Box days when things were so much simpler to maintain. Yet, they say this is progress, although I am not quite sure if the *this* refers to ulcers, undue pressures or countless issues of immediate concern rather than the development of electronic instrumentation. Perhaps future generations of laboratory scientists will reap the rewards of fool proof instrumentation, but I suspect that will never be the case. They will probably have devices far more sophisticated and complicated than we could ever imagine, even to the point where electron tubes will be obsolete and just understanding what all each instrument can do will require as much skill as knowing how it does it.

At the time, frequency drifting with a model 79 B beat frequency oscillator was causing problems. Finally, the Clough Brengle Corporation of Chicago resolved the situation and, for \$42.75, repaired an L&N galvanometer. Sabine's response to the expense was that for that kind of money, instrument repair will be the downfall of many labs. (I wonder what Paul would have thought of a recent \$8,000 repair bill for one piece of equipment?) He also complained about having to pay \$6.00 for a year's subscription to *Electronics*.

On January 31, 1946, a manufacturer asked to have an acoustical paint tested at Riverbank, even though Sabine expressed his reservations to the manufacturer about the unlikelihood of paint, less than 1-mil thick, painted on a hard surface having much absorptive value, especially at the low and middle frequencies. The data proved Sabine right, but convincing the client that there wasn't anything wrong with the data became a major task, one that is repeated even today whenever promoters of acoustical paint contact the lab.

In February 1946, Sabine started the client test-numbering system referred to in an earlier chapter. A more detailed explanation of the test-number history follows:

Initially, Paul Sabine used the year and the test number as an indexing system (for example 46-01, 46-02). In 1947, Luke Ramer inserted an A, which stood for absorption test, or a TL, which stood for transmission loss test, before the numbers (for example A47-100, TL47-200), offering an even more thorough system of tracking the test results. This system remained until 1983, when RAL™ (Riverbank Acoustical Laboratories) was registered and added it to the test numbers (for example RAL™-A83-525).³⁵

In the spring of 1946, Wallace Waterfall returned to Celotex Chicago from New York where he had spent the war and made arrangements through George I. Smith of the same organization to have Paul Sabine write "Theory and Use of Architectural Acoustical Materials," a paper that was eventually published in the AMA bulletin.

Throughout 1946, Sabine was characteristically busy, his time devoted to a

number of diverse projects. In July of that year, for example, two inquiries — one from a Wichita, Kansas radio station and the other for a theater, the Lyceum — for consulting services came in. Additionally, Sabine's interest in hearing aid research continued; he corresponded frequently with the secretary on physical medicine for the American Medical Association and participated in a symposium on hearing aids for the American Otological Society.

In December 1946, Paul Sabine wrote to a Mr. Jackman, chief test engineer for the Consolidated Vultee Aircraft Corporation, who previously had visited Riverbank in regard to a project involving sound control on aircraft. The letter is the first written account to a client of his intentions to leave Riverbank:

In regards to your question about "What were my future plans?" At the moment I am preparing to leave Riverbank and that Mr. L. G. Ramer will carry on the absorption and transmission loss measurements. My address will be 1939 East Mabel Street, Tucson, Arizona. I will retain my membership on the Riverbank Board of Directors and plan to carry on consulting services.

On January 3, 1947, Paul Sabine signed a test report on a product called Econacoustic for National Gypsum Company, the last such report that would ever bear his signature. On January 16, 1947, Paul Sabine left Riverbank for Tucson, Arizona. He was succeeded as director by Luke Ramer, who also became the first administrator to perform his duties under the auspices of the Armour Institute of Technology's (AIT) Armour Research Foundation (ARF), which later became the Illinois Institute of Technology (IIT) and the IIT Research Institute (IITRI). Paul Sabine was instrumental in arranging for Armour to oversee the Riverbank operation, but because the organization did not assume official control until February 1, 1947, he was never an employee.

Just as the deaths of Colonel George Fabyan, Wallace Clement Sabine and Nelle Fabyan marked the end of eras at Riverbank, so, too, did the retirement of Paul Sabine. Under his guidance, the laboratory had become a national model for similar facilities, and with his guidance, the science of architectural acoustics had made great strides toward achieving recognition as a legitimate science.

Indeed, Paul Sabine's feats in acoustics are well documented but what about Paul Sabine himself? What kind of man was he?

Bob Kerfoot, who stood in for Sabine during World War II, was asked in 1983 to answer that very question. His first response, of course, was that Paul Sabine was a person always doing something — not necessarily active things but, rather, always reading or writing. On a trip together to Dayton, Ohio, for example, Kerfoot recalled that Sabine would whip off crossword puzzles as fast as he could read each clue — and with a pen. He also remembered that Paul Sabine always knew what he wanted and how it should be done, but when it came to performing the task at hand, he would take the supervisor's role, watching the action over the top of his glasses.

Kerfoot recalled, too, how frustrated Sabine would get when a door installer would meticulously and interminably hang his company's door for a test, making sure that everything was perfect by checking and adjusting over and over. Sabine told Kerfoot that there had to be something wrong when it took all day to install a door for a test and would only take thirty minutes to install in someone's home or place of business.

Although Paul Sabine was a serious individual when it came to his work, he also possessed a keen sense of humor that often emerged when the pressures of his job were not present. He was capable of a sharp wit that could be self-deprecating but was always provocative. For example, often introduced as an acoustical expert, Sabine would define an *acoustical expert* "as a man who could collect money from a person by telling him something he already knew in a language he doesn't understand." He defined *female intuition* as "that property of the female mind, which enables a women to start from a false premise perceived by faulty logic, and to *always* arrive at the correct solution."

Bob Kerfoot recalled one incident that illustrates the humorous, human side of Paul Sabine. It occurred on a cold day when Sabine drove to Kerfoot's house to pick him up.

Just as Sabine pulled up in front of the house, Lorana Kerfoot, wearing only a nightgown and a lightweight robe, stepped out onto the porch — her foot holding the door open — for the morning newspaper. Still bent over, she spotted Sabine coming up the walk and, realizing her state of dress or undress, became startled and lost her foothold on the door, which slammed shut behind her.

Now it was she, trying to cover and hold herself together, and her husband's boss standing on the porch. As Paul Sabine started to reach toward her, she gasped, only to realize that he was merely reaching past her to ring the doorbell. Kerfoot came to the door, and Paul Sabine said, "Good morning, Bob. I believe your wife would like to come in out of the cold. I'll meet you in the car."

As he turned, he tipped his hat and said, "Have a good day, Mrs. Kerfoot. It's always a pleasure," and proceeded to his automobile. Only after both men were in the car did Paul Sabine describe the scene. Bob Kerfoot said that by the time they got to Riverbank, they were laughing hysterically. Kerfoot stated that it was the only time he ever saw Paul Sabine laugh so hard.

Elizabeth Tinberg, who worked as a secretary at Riverbank from 1940 to 1953, remembered Paul Sabine as a many-sided man, a man of principle and loyalty, and a man who always enjoyed a challenge. He was equally happy raising roses or, in his seventies, learning how to operate a typewriter. He was, as she recalled, one of Riverbank's most notorious practical jokers. Regardless of the side he revealed, Paul Sabine was, in all areas, a man guided by a sense of morality, a code of ethics that he would not compromise. Elizabeth Tinberg recalled an incident involving Belle Cumming that shows clearly how

Paul Sabine dealt with the world. Apparently, Cumming was famous for her habit of using foul language, a trait that Sabine repeatedly asked her to curtail. She made an effort to do so and asked Sabine if he were aware of the fact. When he said, "No," Cumming replied with a cuss word. Sabine responded, "See?"

As chronicled elsewhere, Paul Sabine was not only a scientist and a family man but a concerned, involved citizen as well. His career as a Geneva alderman was highlighted by many hours of work on zoning ordinances for the town and, again, by his sense of justice and moral rightness. As one fellow alderman noted, "This fellow Sabine is the limit. He asks more questions than all of the rest of us put together: He wants to know *all* about what he is voting on before he votes."

Leo Beranek reported that the only time he ever heard Paul Sabine speak of the father-son professional relationship in a negative tone was at the November 1946 ASA meeting in Chicago. Beranek reported that during an open discussion period following an architectural acoustics session, one of the speakers had referred to a published paper as the result of excellent work done by Hale Sabine. Paul immediately stood up, obviously angered, and said, "All my professional life my work often has been attributed to the elder Sabine and now my work is being attributed to my son." Paul continued and when finished, Leo recalled how apparent the hush was that settled over the room as well as how the incident obviously embarrassed Hale.

By the mid-1950s, Paul Sabine's life had moved in a direction that was not fully realized until after his retirement: the integration of science and religion. He had, of course, continued with his consulting practice and his writing, but less and less time was devoted to these endeavors. It should still be noted, however, that it was Paul Sabine who headed the acoustical testing during the remodeling of the House and Senate Chambers in the U. S. Capitol. The results of this testing were published in the March 1952, issue of the *Journal of the Acoustical Society of America*. He was assisted in the project by his son, Hale, and Wallace Waterfall.

This undertaking and other lesser projects notwithstanding, it was the scientist and his relationship with God that occupied Paul Sabine's thoughts and time. In the 1950s, he wrote two books on the subject: *Modern Science and the Will to Believe* and *Atoms, Men and God*. The latter book, for which Sabine became best known, was reviewed for the ASA by Floyd A. Firestone in the September 1953 issue of *JASA* and again by F. V. Hunt in the January 1954 issue of the same publication.

Both reviews found Sabine's work to be thought provoking and scientifically thorough. The opening and closing passages of each review are given here.

According to Firestone,

This book does not pertain specifically to the science of acoustics but will nevertheless be of great interest to acousticians because it is the work of one of the most distinguished contributors to our field of science. Dr. Sabine is the son of a Methodist preacher and cousin of Professor Wallace C. Sabine, who founded the Science of Architectural Acoustics. He has been a professor of Physics at Case School of Applied Science and is a retired director of Riverbank Laboratory of Acoustics. This book which has been fifteen years in preparation, will answer those of Dr. Sabine's friends who have wondered what he was doing in retirement, other than defense work and the planning of the acoustics of the remodeled House and Senate Chambers in our National Capitol. He addresses himself to the problem: "Can I be intellectually honest in believing what, as a Christian, I profess to believe and at the same time accept the teachings of modern science and psychology regarding the nature of man and God and the physical world?"

In searching for the answer to this problem the histories of science and religion are thoroughly reviewed, pertinent facts of chemistry and physics are surveyed, and our knowledge of psychology is explored, an attitude of rational criticism of any proposed philosophical conclusion being maintained throughout.

Firestone continued by discussing the merits of various topics raised in the book and the conclusions reached. He closed his review by stating,

Though this reviewer has a will to believe in a modified mechanistic hypothesis as an explanation of all the phenomena of both mind and matter with a minimum number of assumptions, he enthusiastically recommends this book as a most interesting and scholarly philosophical dissertation, to be classed with the writings of Sir Arthur Eddington and Sir James Jeans. On account of the broad interest in its subject matter, the sales of this book will probably be in orders of magnitude greater than the sales of Dr. Sabine's textbook on "Acoustics and Architecture." Many scientists give but little thought to religion, but when the scientist's child reaches the age when his friends are going to church, a day of decision has been reached. Dr. Sabine has skillfully explored the coupling between science and religion; the extent to which the reader agrees with the author's conclusions will depend on his personal coefficient of coupling.

F. V. Hunt's review, like Firestone's, begins by noting both Sabine's reputation and his attempt to address faith on an intellectual plane:

This book has nothing to do with acoustics. But when an elder statesman of acoustics, a founder and former President of the Acoustical Society of America, requests a hearing, it behooves all to give ear — and all the more so when the voice is that of the man who has been "Uncle Paul" to a whole generation of acoustical scientists. A good many engineers and scientists seem able to extend the concept of separated variables far enough to insulate themselves against any demands on faith that go beyond reliance on tight connections and a good impedance match. These will find Sabine's book too full of words to satisfy them. Another group is likely to go so far as to concede that the problem of science and religion is important and that they intend to think it when they get a little spare time. These people should add this book to their shelf now so that it will be at hand in case that spare moment should turn up without warning. To

still another group who grow troubled by divergence between faith of their fathers and their daily scientific bread, "Atoms, Men and God" may be the word that can make them whole again. The question to which Sabine addresses himself is one that must be faced sooner or later by every thoughtful scientist who is neither a confessed schizophrenic nor a determined atheist. Put simply, the question is whether it is possible to adhere to a deep religious faith and to accept the teachings of modern physical science and psychology, without invoking a double standard of intellectual honesty. The frame of reference is that of a Protestant Christian, but the arguments will sting with almost equal force the complacent of any faith.

Let it be said firmly at the outset that here is not an example of an old man (may we all stay so young!) seeking to mend his religious fences by maundering metaphysics in his dotage: far from it. Here is incisive introspection presented with candid frankness and a keen alertness for the pitfalls of self-deception.

The pattern of exposition follows the sound scientific practice of marshaling objectively the data, the facts and observations, so that they can be studied as a whole to see what conclusions they support.

Hunt's review continued with specific attention paid to subjects such as entropy, organic evolution, relativity and wave mechanics, behaviorism, Freudian psychology, and inner psychology. It ended:

Those who have been privileged to know Uncle Paul will know without being told that he answers his basic question in the affirmative; otherwise he wouldn't have written this book. This answer, that he felt driven to pursue, is unobtrusively presented without becoming diffidence, and with a total lack of brash insistence. Of course, every apostle of newly-perceived truth desires the fulfillment of having his perception shared. And yet, I don't think Uncle Paul will mind very much if your own convictions and the evidence presented lead you to a different terminal conclusion from the one he reaches. But mark this well: whether you come out where he does or not, the evidential reasoning set forth in "Atoms, Men and God" will haunt you till you make your own peace with it one way or another.

Excerpts from *Atoms, Men and God* were included in *Creative Power of The Mind*, a publication of Prentice-Hall containing the best thoughts of outstanding men of modern time. As a result of this publication, Sabine was invited to be a guest on the Edward R. Murrow radio program, *This I Believe*, in September 1954.

In his late seventies, his eyesight failing, Sabine still possessed a quick and inquisitive mind and an ever-growing faith in God, as seen in a letter sent on August 1, 1958, to a friend, Wilmer T. Bartholomew, of Gaithersburg, Maryland:

You'd never guess that this letter was typed by a youth of 78 summers and no winters apparently.

That last was written at the end of my day, and since I had that crack some time ago, just when I can't remember, I find it difficult at times to orient myself

properly in the "space-time manifold" in which we live and move and have our being. It's much more comfortable for me to think of myself as sane and all the rest of the world except a few choice souls like you as just a little "teched in the head."

Your letter has been very helpful to me who still believes that God's in his heaven though "all" is far from right with the world. Your analysis, ending up as it does with a "leap of faith" that all is right, I find most helpful.

This world wouldn't be crazy if there weren't so many crazy people in it. So we'll put our trust in the Almighty and ignore the folly of the fools who say in their hearts "there is no God." They just don't know what they're talking about.

I am interested, along with many thoughtful men of today, in the trend of technical scientific thinking on spiritual implications of scientific realities. You may know the writing along religious lines of Clarence Randall, retired president of Inland Steel. I knew him at Harvard and have always admired him.

When scientific and religious thinking go far enough they discover that they both are facets of a single shaft of eternal truth. One is reminded (by turmoil of the present world situation) of the book of Job, where "the sons of God came together" and "Satan came also" and got permission of the Almighty to give Job a workout to test his loyalty. Was the author of that book unrealistic in giving it a happy ending for poor old Job after he'd been put through the wringer, just to show that the Devil had underrated Job's staying powers? You'll have to come out here so we can talk this out. Being coherent while typing is for me like the stunt of rubbing my head and patting my tummy at the same time — it's hard.

This letter to his friend was one of the last Paul Earls Sabine would write. He died on December 28, 1958 and was buried in Geneva, Illinois.



Hale Sabine.