AUTOBIOGRAPHICAL NOTES

(a) I was born in Provo, Utah, in a family of nine children. There were four older than I--3 boys and 1 girl--and four younger--1 boy and 3 girls. My father was a contractor and builder. When he was 8 years old he walked along side a covered wagon from the Missouri River to Salt Lake City landing there in the summer of 1852. In my early teens, father suddenly became deaf, and so had to give up his work as a contractor. After this he had a 20 acre farm on which his five boys worked when they were not in school.

(b) Provo City Schools through the eighth grade--8 years
Brigham Young High School (Provo)--4 years
Brigham Young University-College plus three years
University of Chicago--3 school years and two summers

(c) I failed in my first course in High School Physics. I knew the failure was my own fault and I wanted to show the teacher that I could understand physics. I repeated the course and obtained an A grade and was head of the class. I did so well that they asked me to assist in the laboratory the next year and the following year I was asked to teach a class in Physics. I have been associated with Physics ever since that time (1905).

(d) R. A. Millikan was supervisor but I don't remember other members of the committee.

(e) The determination of the electrical charge on the electron--by the oil drop experiment--work with Millikan. (See note on Item e which is attached)

(f) The second in importance was the work on Brownian movements in air referred to in the note on item e which is attached.

The third in importance was the discovery and determination of critical bands of hearing.

The fourth in importance is the paper on the dynamics of the cochlea.

The fifth in importance is the work on stereophonic sound. Although this was a group effort which I directed, I do hold the fund amount patents.

(g) In my early work Professor Millikan had a real influence upon my research inclinations. Later Dr. H. D. Arnold of the Bell Telephone Laboratories was also very influential.

(h) 

(i) No

(j) No
(k) Fishing and Church Work.

(l) V. O. Knudsen--recent Provost of U.C.L.A.
Ray Olpin--President University of Utah
Wayne B. Hales--Dean of General College, Brigham Young University
Milton Marshall, Chairman Department of Physics and Mathematics
for many years at Brigham Young University
Carl Eyring--Dean of College of Arts and Sciences at Brigham Young
University

I taught them in classes of physics and mathematics.

(m) Given on separate sheet

(n) Given on separate sheet
Due to the importance of this experiment which I think was really the beginning of the electronic age, I am giving here an account of what happened in Ryerson Physical Laboratories when this work was started. Those at Ryerson at the time have somehow given an exaggerated account of my work in it. So for the first time I am giving my account of what happened. It does not agree completely with Professor Millikan's account given in his various publications, but I am sure what he said was perfectly sincere and was given in accordance with his best memory. There were many things going on in his mind that I did not know and also there were many things in my mind and many things that I did in the laboratory that he did not know.

I started work in the graduate school there in the fall of 1908. After one year's work I went to Professor Millikan (in the fall of 1909) to get suggestions for a thesis for my doctorate. At the time Professor Millikan's rank was Assistant Professor. His interest up to this time had been principally in the field of education. He and Professor Gale had just written a high school text on physics which was becoming very popular, and he was still interested in seeing a general course in science develop for the high schools. I aided in this program at the College of Education where there was an experimental high school. I taught this proposed general science course for one year.

As I stated above I went to see Professor Millikan about a thesis and found him in the laboratory working with a graduate student, Mr. Begeman. They were working on the so-called water drop experiment for determining e. A small expansion chamber was mounted on the end of a microscope. Upon expansion of saturated air contained therein, small water droplets were formed. They were appropriately lighted so that one could view them through the microscope. By means of an electrode plate at the top and one at the bottom a vertical electrical field could be created within the chamber. This was a modified version of the work done by J. J. Thompson and H. A. Wilson of the Cavendish Laboratory at Cambridge. They let me look through the small microscope and see the little droplets of water. They could only be held in the electric field for 1.5 to 2 seconds which was a real handicap for obtaining accurate data. The three of us then discussed means of getting around this difficulty. It was suggested that drops made of oil, mercury and several liquids would not evaporate so quickly. Professor Millikan said there is your thesis. Why not try out one of these liquids—oil being the simpliest to use and to procure. We also discussed some possible arrangements and then they went on with their experimenting and I went down into the shop and started to build a "haywire" set to see if something simple could be built that would work.

I found two circular brass plates about 20 cm in diameter and soldered some posts to them so they could be supported by the usual laboratory stand. I then bored a small hole through the top plate about the diameter of a pin. I then took them into the laboratory and supported them on laboratory stands so that they were parallel or 2 cm apart. I set up an arc light and a condenser lens which were available in the laboratory. Then, a parallel beam of light could be passed between the plates. There was also a 2000 volt storage battery available in the laboratory which I used to produce a field between the plates. To view the oil drops I borrowed the cathetometer from the College Physics laboratory.
I went to the corner drug store and bought an atomizer—one usually used for spraying perfume about the room and I was ready to try what I considered a "rough and ready" type of experiment. I was all alone in a small research room when I first tried this experiment. I sprayed the oil above the plates and then looked through the cathetometer telescope. I was not prepared for the beautiful sight that I was to see. First the large drops came through in a tiny stream as they were falling faster than the small ones. After a short time the small ones came into view and what a sight it was. For they were all the colors of the rainbow. They were just the right sizes to have a specific effect on the different colors in the light. Also they were all trembling as though they were timid to show themselves. This was, of course, due to the Brownian Movements. I was so entranced with this sight that I did not turn on the electric field for some time and until all the large drops had fallen to the bottom plate. When it was turned on I saw another beautiful sight especially from a scientists point of view... About 1/3 of the oil droplets reversed their downward direction of motion and started upward with different speeds—about 1/3 increased their speeds downward—and the other 1/3 were unaffected.

Even with this rough set-up I could concentrate my attention on one oil drop and cause it to make several trips before it drifted out of the field of view. I used the same equations that Millikan and Begeman were using to calculate the electrical charge. Of course these were the ones developed by H. A. Wilson.

Due to good luck rather than any planning, the small drops were just the right size so when they were carrying 1, 3, 4, or 5 electrons the 2000 battery produced an electric field between the plates that would pull these drops against the gravitational field.

I was able that first afternoon to obtain a value of $e$ that was more accurate than any before. I then called Professor Millikan but he was busy so I had a second afternoon all to myself. The third afternoon Professor Millikan joined me. Of course he was tremendously thrilled and from that time on we worked together every afternoon for the next two years while I was at Ryerson. Of course new apparatus was built in the shop and revised many times during that period. Professor Millikan and his students worked on various phases of this experiment for five years after I left Ryerson.

It soon leaked out that we were doing some important new research and newspaper reporters came to see us. We obtained front page publicity not only in Chicago but in all the papers all over the United States. In terms of motion picture parable I received equal billing with Professor Millikan—an examination of the newspapers in the winter of 1909-1910 will show. Soon after this publicity Dr. Steinmetz from the General Electric Co. visited me at Ryerson and wanted to do the experiments himself. For a good part of an afternoon a droplet moved up and down and he watched it change its velocity when an ion from the air fastened itself on the drop. He also found out to his own satisfaction that charges by the droplets were multiples of 1, 2, 3, 4, etc. As he left he shook his head and said "It will now be necessary to revise all my notions about electricity."
The time came for our first scientific paper to be published in Science—1910. I spent considerable time on the paper for I understood that at least part of it would be used for my thesis.

At the same time we were working on the determination of $e$, we also carried on the experimental work on Brownian Movements. Just a few years before Einstein had developed the equations which indicated statistically the average distance a small particle would be from its initial position in any given time. I modified these equations to give the variations in the time of fall of a small oil drop as it falls from the top cross hair to the bottom one. The average time departure from the average time is related to Avagadros number. Also these equations permitted us to calculate $N_e$ without the use of Stokes' law of fall.$^4$ This was the first time it was proved that ions in the air carry the same charge as those in chemical reactions.

Just before sending in our first paper on the determination $e$, Professor Millikan came to our small apartment on the west side of the campus for a discussion of the two papers mentioned above. Instead of publishing them both as joint authors he proposed that he be the author of the first one on the determination of $e$ and that I be author of the second one on Brownian Movements. This would make it possible to use the second paper as my thesis. A thesis cannot be by joint authorship. I was disappointed but agreed to this suggestion.

This accounts for the fact that although newspapers give Professor Millikan and I equal credit for this important work, the first scientific publication of it was under Millikan's name.
OUTLINE OF DR. H. FLETCHER'S WORK IN ACOUSTICS

Dr. Fletcher joined the Engineering Department of Western Electric Company, the predecessor organization of the Bell Telephone Laboratories, in 1916, where he began to study the general problem of telephone transmission. Soon thereafter he came to the conclusion that the greatest need in the development of this problem was a better understanding of the properties of speech and the nature of the hearing process. The recognition of this fact started the train of his productive researches in acoustics. For a quarter of a century he has been a guiding spirit in the acoustical activities of the Bell Telephone Laboratories, most of which were carried on under either his immediate or his general supervision.

One of the most important acoustical problems to which he devoted his talents for a number of years was the development of the theory of telephone quality, i.e., a theory by which the speech articulation of any speech communication system may be determined from its physical constants and the physical environment of the terminal stations. Not much of this work has been described in publications, but the results were made available to other laboratories during the war, where they served as the basis for the evaluation and the engineering of military speech communication equipment under various operating conditions. This work on the theory of telephone quality required the development of new sound measuring equipment and of new high quality telephone instruments for laboratory use. The notable progress made in these directions at the Bell Telephone Laboratories was in large measure inspired by him.

He directed the development of a stereophonic system whereby in 1933 the music of the Philadelphia Orchestra was transmitted over telephone wires from Philadelphia and reproduced in Constitution Hall in Washington, D.C. with a fidelity unapproached by other methods: Under his supervision this work was later extended to the development of a method of stereophonic recording and reproducing in which none of the sound quality of orchestral music is lost. This system was publicly demonstrated in Carnegie Hall, New York City in 1939. With these two sound systems, studies were made of the physical factors governing musical quality. Some of the results of these studies were presented in the Fifteenth Joseph Henry Lecture, Philosophical Society, Washington, D.C., which was delivered by him on May 18, 1946 under the title "The Pitch, Loudness and Quality of Musical Tones".
The work on hearing, which he either conducted personally or directed, has been of a psycho-acoustic nature. In these studies techniques were developed for determining such factors as threshold sensitivity, loudness of simple and complex tones, differential pitch and intensity sensitivity, and the masking of one tone by another. The unifying principle in all of this work was the theory of hearing to which he made outstanding contributions. These were presented in part in his paper "A Space-Time Pattern Theory of Hearing", published in the Journal of the Acoustical Society in April, 1930.

For many years he has had a great interest in improving the conditions for the hard-of-hearing. This interest led to his invention of the audiometer, an instrument whereby the hearing loss may be accurately measured, thus providing a tool that enables otologists to make a more accurate diagnosis of the nature of the hearing defects of their patients. Long before vacuum tube hearing aids became commercially available he set up laboratory models and with these studied the requirements of such instruments. The high appreciation of his work for the hard-of-hearing is evidenced by the fact that he was awarded the Levy Medal by the Franklin Institute for a paper "Physical Measurements of Audition" in 1923 and that he was elected President of the American Federation of Organizations for the Hard-of-Hearing in 1929. It is here also of interest to note that in 1937 he, by invitation, lectured in France and Germany on various phases of audition.

In 1929 he published a book entitled "Speech and Hearing" which quickly became the standard work on the subject. It has been widely quoted by both physicists and psychologists.

In 1929 Dr. Fletcher helped to organize the Acoustical Society of America, and more than anyone else was responsible for getting it established on a broad scientific basis. He was elected its first President.


3. Fletcher, H., and Millikan, R. A., The Question of Valency in Gaseous Ionization, Phil. Mag., June, 1911


6. Fletcher, H., Upon the Question of Electric Charges which are Smaller than the Electron, Phys. Zeit., August, 1915


10. Fletcher, H., The Use of the Audiometer in Prescribing Aids to Hearing, College of Physicians, April, 1923


12. Fletcher, H., Audiometric Measurements and Their Uses, Trans, College of Physicians, April, 1923

13. Fletcher, H., Physical Properties of Speech, Music and Noise, Bell Telephone System Monograph B-941, February, 1924


17. Fletcher, H., Useful Numerical Constants of Speech and Hearing, Bell System Tech. Jour., July, 1925
Fletcher, H., Methods and Apparatus for Testing the Acuity of Hearing, The Laryngoscope, July, 1925

Fletcher, H., Theory of the Operation of the Howling Telephone, Bell System Tech. Jour., January, 1926

Fletcher, H., Measuring Children's Hearing, Bell Record, June, 1926


Fletcher, H.; (Discussion of paper by C. C. Bunch), Comparison of the Results Made with Two Types of Audiometer, Arch. of Otolaryngology, July, 1926

Fletcher, H., Demonstration of Principles of Talking and Hearing with Application to Radio, Annals of Otology, Rhinology and Laryngology, March, 1927


Fletcher, H., Hearing Aids and Deafness, Bell Record, October, 1927


Fletcher, H., and Steinberg, J. C.; Articulation Testing Methods, Bell System Tech. Jour., October, 1929

Fletcher, H., A Space-Time Pattern Theory of Hearing, Journ. Acous. Soc. of Amer., April, 1930

Fletcher, H., Physical Characteristics of Speech and Music, Rev. Mod. Phys., April, 1931; Bell System Tech. Jour., July, 1931

Fletcher, H., Can We Scientifically Advise Patients As To The Effectiveness of Hearing Aids? Annals of Otology, Rhinology and Laryngology, September, 1932

Fletcher, H., Evaluating Hearing Aids, Bell Record, January, 1933


Fletcher, H., Auditory Perspective - A Symposium, Electrical Engineering, January 1934; Bell System Tech. Jour., April, 1934


Fletcher, H., Loudness, Pitch and Timbre of Musical Tones, Journ. Acous. Soc. of Amer., October, 1934


Fletcher, H., and Manson, W. A.; Relation Between Loudness and Masking, Journ. Acous. Soc. of America, July, 1937
38. Fletcher, H., Loudness, Masking and Their Relation to Hearing and Noise Measurement, Jour. Acous. Soc. of Amer., April, 1938


40. Fletcher, H., Auditory Patterns, Rev. of Mod. Physics, January, 1940

41. Fletcher, H., Stereophonic Sound-Film System, A Symposium, Jour. Soc. Motion Picture Engrs., October, 1941; Jour. of Acous. Soc. of Amer., October, 1941

42. Fletcher, H., Hearing, The Determining Factor for High Fidelity Transmission, Proc., I.R.E., June, 1942

43. Fletcher, H., Scientific Progress and Civic Responsibility, Univ. of Utah Press, June, 1944

44. Fletcher, H., The Atomic Bomb, The Improvement Era, March, 1946

45. Fletcher, H., The Pitch, Loudness and Quality of Musical Tones, Amer. Jour. of Physics, July-August, 1946


52. Book - Speech and Hearing in Communication, 1961


Improve mental Era Publications. Salt Lake C.

55. A Secret of the Mysteries Vol 38 - 1735

56. Formula from Life - Vol 39 - 1936

57. Probability - Vol 41 - 1738
68. The Importance of the Six Lost Years: Vol. 43 - 1940
69. The Atomic Bomb: March - 1946
60. Book - The Good Life - 1962
Dr. Harvey Fletcher was born in Provo, Utah, September 11, 1859. He was graduated in 1907 from Brigham Young University with a Bachelor of Science Degree. In 1911 he received a Ph.D. Degree, summa cum laude, from the University of Chicago. From 1911-16 he was head of the Department of Physics at Brigham Young University. During this period he served a term as president of the Utah Academy of Science. In 1916 Dr. Fletcher joined the Western Electric Company's Engineering Department which later became a part of Bell Telephone Laboratories. His work was concentrated on problems of speech and hearing. Perceiving the need for improved means of hearing measurement, he directed the development of the audiometer, first scientific device of its kind, which is now in general use among otologists. With this instrument he measured the hearing of hundreds of persons and determined the threshold of hearing for the normal ear. Many of his researches have been focused on the problem of improving sound transmission. These are described in papers such as "Hearing, the Determining Factor for High-Fidelity Transmission," "Auditory Perspective," and "A Space-Time Pattern Theory of Hearing". The last resulted from his belief that the sense of space might be conveyed adequately to an audience if there were three complete sound channels between them and the originating stage. A system of this kind was first demonstrated in 1933 between Philadelphia and Washington, and a similar one involving extra-wide frequency range and recordings and enhancement of the loudness range was demonstrated in New York in 1947.

In 1929, Dr. Fletcher became Acoustical Research Director of the Laboratories and since 1933 he has been Director of Physical Research. He has received numerous awards for his scientific contributions. These include the Louis Edward Levy Gold Medal presented in 1924 for his work on physical measurements of audition. He holds honorary doctor's degrees from Columbia University, Kenyon
College, Stevens Institute, Case Institute of Technology and the University of Utah. He is the author of the well known work "Speech and Hearing" and of many technical articles. He is often sought as a lecturer and has appeared before numerous learned societies in this country and abroad. In World War II Dr. Fletcher was chief of the section on Acoustics of the National Defense Research Committee. He is a fellow of the American Physical Society, of which he was President in 1945; the American Academy for the Advancement of Science, of which he was Vice-President in 1937-38; The American Institute of Electrical Engineers, the American Society for the Hard of Hearing (President 1929-30) and the Acoustical Society of America (President 1929-30). He is a member of the National Academy of Sciences, of Phi Beta Kappa and Sigma Xi and is an honorary member of the American Otological Society. The Acoustical Society of America awarded him an honorary membership in May, 1949. Dr. Fletcher serves on the National Research Council and in 1947 became a member of the Committee on Hearing, Division of Medical Sciences. This year he presented a series of lectures at Cornell University on "The Perception of Speech and Its Relation to Telephony". Dr. Fletcher lives at 5 Westminster Road, Summit, New Jersey.

(Present Address 1615 N. Willow Lane
Provo, Utah)

Taken from Bell Telephone Record
while I retired

August, 1949
1907  B.S., Brigham Young University
1910  Elected member Sigma Xi
1910- 1911  Research work with Professor R. A. Millikan on the Determination of the Elementary Electrical Charge and other problems of Electron Physics.
1911  Elected associate member American Physical Society and to Society of Phi Beta Kappa. Ph.D. Summa Cum Laude, University of Chicago
1911- 1916  Head of Department of Physics, Brigham Young University
1915  Elected member American Physical Society.
1915- 1916  President Utah Academy of Science
1916- Present  (June 1) Engineering Staff of Research Department of Bell Telephone Laboratories (formerly Engineering Dept of Western Electric Company). Now Director of Physical Research
1920  Elected Fellow American Physical Society
1921  Elected Fellow American Association for Advancement of Science
1922  Elected member American Institute of Electrical Engineers
1924  Award of the Louis Edward Levy Gold Medal for paper entitled "Physical Measurements of Audition", Published Sept 1923 Journal Franklin Institute, 197, 708, 1924
1926  Elected member Board of Managers of American Federation of Organizations for the Hard of Hearing
1929  Elected President American Federation of Organizations for the Hard of Hearing (June) 1929-1930
Elected President Acoustical Society of America (May) 1929-1931
Member of Noise Abatement Commission of New York City 1929-1932
1930  Elected Fellow American Institute of Electrical Engineers
1931  Elected member Executive Committee, American Institute of
      Physics
      (1931-36) Elected member Governing Board
      (1931- , 1940-6)
1933  Elected to the Board of Directors, American Association for
      the Advancement of Science
      Appointed Director of Physical Research - Bell Telephone
      Laboratories.
      First Presentation of Stereophonic Sound Transmission
      and Reproduction in Constitution Hall, Washington, D. C.
      of Philadelphia Orchestra.
      Elected Member National Research Council.
      (Section - Psychology)
1934  Elected member Franklin Institute, Philadelphia, Pa.
1935  Elected member National Academy of Science (April)
      Received honorary degree ScD Columbia University (June 1)
1936  Elected to Division of Physical Sciences - National
      Research Council for period 1936-1939
      Elected honorary member American Otological Society
1937  Lectured in France and Germany on various phases of
      Audition.
      Elected National Councillor Ohio State Research
      Foundation (1937-)
      Elected Chairman Section B of AAAS
1939  First Presentation of Stereophonic Recording in
      Carnegie Hall (April) of Philadelphia Orchestra,
      Salt Lake Tabernacle Choir and other Selections
1940  Appointed Chairman Section 5, Division C of NDRC (Oct. 31)
1942  Received honorary degree ScD from Kenyon College (May 11),
      Case Institute of Technology (May 17) and Stevens Institute
      of Technology (May 2)
      Appointed Chief Section 17,3 of NDRC (December 9)
1944  Elected Vice President American Physical Society
      Received honorary degree ScD from University of Utah
      (June 6)
1945  Elected President American Physical Society (Jan 20)
      Appointed to Advisory Board of American Physical Society
      (1945- ) Research Council of Rutgers University (Jan 15)
      Appointed member Division 16, NDRC (March 14)

1946  First Demonstration–Lecture on "The Pitch, Loudness and
      Quality of Musical Tones" (using Tone Synthesizer) at
      American Physical Society (Jan 25) Given as 15th Joseph
      Henry Lecture, Philosophical Soc. of Washington, D C (May 25)

      Appointed member of Committee on the John J Carty Fund
      (National Academy of Sciences) for 5-year term (June 7)
      Radio talk on "The Science of Hearing" (CBS) (Oct 6)

1947  Repeated Demonstration–Lecture on "The Pitch, Loudness
      and Quality of Musical Tones" (using Tone Synthesizer)
      at the Franklin Institute, Philadelphia (Oct 16)
      At joint meeting of Institute of Radio Engineers,
      AIEE and Engineering Institute of Canada in Montreal
      (March 13) At University of Toronto at meeting of
      Royal Canadian Institute (March 15)
      Appointed Member Committee on Hearing, Division of
      Medical Sciences, National Research Council (1947- )

1948  Appointed as member of National Research Council assigned
      to the Division of Engineering and Industrial Research
      for period ending June 30, 1951
      Received USA certificate of Merit from President Harry S. Truman

1949  Appointed member of Standing Committee on Meetings of
      the National Academy of Sciences for 3 years (7/1/49-52)
      Gave Messenger Lectures at Cornell University on "The
      Perception of Speech and Its Relation to Telephony"
      (April 11-21 inclusive)
      Received honorary membership in the Acoustical Society
      of America (May 6)

      Talk at Audiological meeting of Fourth International
      Congress on Otolaryngology, London (July 15-16)
      Received Society of Motion Picture Engineers Progress
      Medal Award (October 12) (Gold Medal)

      Elected to Honorary Membership of Audio Engineering Society
      (Oct 28, 1949)

      Received the Honors of the American Speech and Hearing
      Association (Dec 29)
1950  Appointed Professor of Electrical Engineering at Columbia University

1952  Published book entitled *Speech and Hearing in Communication*

1953  Appointed Research Director for Brigham Young University

1954  Chairman of Engineering Department at Brigham Young University

1957  Dean of new College of Physical and Engineering Sciences at Brigham Young University

1958  Received Gold Medal from Acoustical Society of America

1958  Gold Medal from Audio Engineering Society

1960  Elected Honorary Member of SMPTE
RESUME OF HONORS GIVEN TO

HARVEY FLEETCHER

SOME FIRSTS

First physics student to be given the high honor summa cum laude at the University of Chicago.

First L. D. S. member to be elected to the National Academy of Science.

First and only member of the staff of the Bell Telephone Laboratories (8000 members) to be elected President of the American Physical Society.

First president and co-organizer of the Acoustical Society of America.

Member of the first executive committee and co-organizer of the American Institute of Physics.

First to introduce the group audiometer into the school room and thus start the program of testing the hearing of school children which is now going on in practically all of the schools in the country.

HIGH HONORS HAVE BEEN GIVEN BY THE FOLLOWING NATIONAL SOCIETIES:

Acoustical Society of America - See Item #1.
Oto logical Society of America
Audio Engineering Society
Society of Motion Picture Engineers
Franklin Institute
American Society of Speech and Hearing
United States Navy
United States Army
President of the United States - H. S. Truman

(See Item #2)
(Picture #1)

HONORARY DOCTORS DEGREES HAVE BEEN CONFERRED BY THE FOLLOWING UNIVERSITIES:

Columbia University
(See Item #3)

University of Utah

Kenyon College
HONORARY DOCTORS DEGREES - Con't.

Stevens Institute of Technology
Case School of Applied Science
Brigham Young University

GOLD MEDALS RECEIVED FROM:

Franklin Institute
Society of Motion Picture and Television Engineers
Acoustical Society of America
Audio Engineering Society

PRESIDENT OF FOLLOWING NATIONAL SOCIETIES:

American Physical Society

Citation

"Harvey Fletcher, Director of Physical Research, has been elected President of the American Physical Society for the 1945 term.

One of the foremost authorities on speech and hearing, Dr. Fletcher directed the Laboratories' pioneering work in this field. His book Speech and Hearing is a classic, and he is author or co-author of numerous professional papers on various acoustical subjects. He is a member of the National Academy of Sciences and was the first President of the Acoustical Society of America."

March 1945

Acoustical Society of America

American Hearing Society
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