

A Most Interesting Man of Science: The Life and Research of Richard Rozzell Fay

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Abstract On May 25, 2013, a special symposium was held at the Mote Marine Laboratory in Sarasota, FL to honor the outstanding careers of Drs. Richard R. Fay and Arthur N. Popper, a “dynamic duo” of scientists who were pioneers in the field of contemporary fish hearing and bioacoustics. The present article details the research, academic life, and “other side” of Richard Rozzell Fay, a most interesting man of science who is known to all as a kind, gentle, wise, and introspective scientist.

Keywords Goldfish hearing • Psychoacoustics • Physiology • Von Békésy

Richard “Dick” Fay (Figs. 1 and 2) born on May 5th, 1944 in Holden, Massachusetts where he grew up and during his early years he attended Wachusett Regional High School. As Dick tells the story, he was not a “joiner” in high school which is why his English teacher advised him to participate in some extracurricular activities or he would not get into college. His teacher managed to get him appointed Editor of the High School Yearbook, an endeavor that Dick enjoyed very much despite the fact that he had to ride the bus over-an-hour to and from school every day. In addition to being an editor, Dick also began writing a column in the school newspaper on his true love ... “Jazz.” A bit sophisticated for the average senior high school student but Duke Ellington, Sidney Bechet, and the “ultimate” Art Tatum came alive with Dick and for those students interested in jazz in 1962. Dick’s early duties as a writer and editor would serve him well later in academia and as a co-editor of the Springer Handbook of Auditory Research series. Growing up in a rural isolated small town with a population of less than a thousand people in the middle of Massachusetts, Dick spent his free time pretty much as many others there did perfecting their shooting skills at the Eight Point Sportsman’s Club. For the non-sportsman, “Eight points”

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Fig. 1 Richard R. Fay in the laboratory (circa 1968)



Fig. 2 Richard R. Fay at a scientific conference in Shanghai, China (circa 2007)



represents the number of points or spikes on the antlers of a large male deer. The Eight Point Sportsman's Club is where Dick perfected his shooting skills with many different types of rifles practicing target, skeet and trap shooting (but no hunting). Perhaps Dick's early interest in rifles stemmed from his father's hobby as an expert

gun collector. Dick spent many hours with his father at gun dealers learning about the mechanisms, models, and bullets of guns used during the Revolutionary and Civil Wars as well as more modern guns. Dick still today showcases many of his historic guns at this home on Cape Cod in Falmouth, MA. I hear from Dick's wife Cathy Fay that their children Chris and Amanda, and even their grandkids Nate and Evan are excellent shots!

Dick's father, Charles Rozzell Fay was of great influence on Dick during his precollege years growing up in Massachusetts. Charles Fay was a descendant of John Fay who emigrated from England to Massachusetts on the *Speedwell* in 1620. Charles was a mechanical engineer who received his law degree from George Washington University and became a patent attorney. He practiced patent law in Worcester, MA with Dick's grandfather, Albert E. Fay, who was also a mechanical engineer and patent attorney. It was the firm of Fay, Fay and Hawley that patented many of early rocket designs of Robert F. Goddard, often recognized as the founding father of modern rocketry. As Dick often mentioned, Charles Fay loved his profession and was most enchanted with dealing with what he termed the "Yankee Ingenuity" of the creative New England inventors. Charles would entertain the family with humorous stories of the almost yearly patent applications for a "Perpetual Motion" machine. Dick spent many hours watching his father make intricate and precise mechanical drawings for the many patents over the years. Dick says his love for "precision" stemmed from seeing these early drawings and that he often attempted to replicate.

Charles R. Fay met and married Dick's mother Ingrid Clara Tellefsen, who was from Trondheim Norway, while working in the patent office in Washington DC. At the time Charles met Ingrid she was an assistant to the US Ambassador to Norway. Later, Dick's mother Ingrid Fay and aunt would buy a small island on Kezar Lake in Lovell, Maine as a summer getaway. The island soon became known as "Birch Island" by the Fay family. Dick would spend every summer there with his family swimming, boating, fishing and later working as a dishwasher at the Sunset Inn down the lake from the family camp. To this day Dick and his family still make their annual summer visit to Birch Island which is actually very close to the summer home of Stephen King, a famous American author of contemporary horror and supernatural fiction. I remember Dick telling me a great story about a young movie director named Monroe Mann who asked Dick if he could shoot part of his movie on the docks of Birch Island to make a low budget comedy horror film called "You can't kill Stephen King." Dick did grant permission and part of the movie was filmed on the docks of Dick's summer home on Birch Island. If you look carefully, you can still find this B-movie available on the web for rent or sale!

In 1962, Dick headed off to college in Brunswick, Maine where he attended Bowdoin College. According to Dick, he chose Psychology as his major because he found comparative psychology and especially "Behaviorism" an appealing concept and a topic he thought he would enjoy exploring. During his studies, we would later find that the approach of the early psychophysicists such as Ernst Weber, Gustav Fechner, Stanley Smith Stevens, Hermann von Helmholtz, Wilhelm Wundt and later Georg von Békésy were also worthy of study. It was at Bowdoin that Dick became

lifelong friends with fraternity brothers Barry Timson, Maine Coastal Geologist and John Tarbell, New York Financier. Dick also became an avid downhill skier while at Bowdoin spending most weekends skiing in Maine until he graduated in 1966 with a BA in Psychology.

After graduating from Bowdoin College, Dick went on to pursue a master's degree at Connecticut College in New London, CT. Dick chose Connecticut College because it was one of the very few schools at that time to offer a degree in Physiological Psychology. It was during this time that Dick started working on goldfish hearing for his master's thesis titled "Auditory Sensitivity of the Goldfish within the Nearfield." According to Cathy Fay, one night in the lab at Connecticut College while Dick was working on determining hearing thresholds in goldfish using a behavioral method that utilized a conditioned suppression of heart rate, Dick noticed (while carefully observing the fish's behavior) that the goldfish was consistently exhibiting a conditioned suppression of respiration to the tones. This behavioral method would later be described in Dick's thesis and would subsequently be successfully used by Dick in his research for the next 45 years! While at Connecticut College Dick met and married classmate, Catherine Hill, who graduated a year before Dick in 1967. After graduation, Cathy worked as a Research Analyst at the Stanley Cobb Neuropsychiatric Laboratory at Mass General Hospital in Boston. During this time, Dick also became a research assistant of Paul Smith at the U.S. Navy Submarine Base in Groton, CT to continue his studies on goldfish hearing. Dick would then later graduate in 1968 with an MA in Physiology Psychology from Connecticut College and publish his first two papers based on his master's thesis work (Fay 1969a, Fay and MacKinnon 1969).

One side note about Dick: he has always had an interest in the history wrought by old American graveyards, and he spent a great deal of his time in college and high school visiting the many old New England graveyards and would make delicate "rubbings" of the gravestones. Cathy spent many "dates" rubbing gravestones with Dick in graveyards around New London CT and she still fondly remembers Dick's excitement and enthusiasm about his historic gravestone discoveries. The Fay children find this aspect of Dick's life very fascinating and they often marvel that this was what their dad was doing instead of going out partying or drinking.

After obtaining his master's degree, Dick decided to pursue a PhD degree at Princeton University in New Jersey. Dick chose Princeton University because he wanted to work with Ernest G. Wever who at the time was famous for his two books: *Theories of Hearing* (1949) and *Physiological Acoustics* (co-authored with M. Lawrence in 1954). While at Princeton, Dick continued his work in Wever's Auditory Research Laboratory on hearing in goldfish that culminated in a PhD thesis in 1970 titled "Hearing and Frequency Discrimination in the Goldfish (*Carassius auratus*)," which would be the basis for his next three papers (Fay 1969b, Fay 1970a, Fay 1970b). During this time, Dick and Cathy had their first child Christian Martin Fay who was born in November 1969. After receiving his PhD in 1970, Dick stayed on at Princeton working with Wever as a postdoc and the Fay family moved into faculty housing on Lake Carnegie in Princeton, which according to Cathy was a "beautiful spot." At Princeton, Dick met and remained lifelong friends with a

number of Princeton colleagues that included Jim Simmons, George Gourevitch, Sam Ridgeway, Jerry Palin, Jim Saunders, and Jim McCormick.

During Dick's last year as a postdoc year at Princeton, Georg von Békésy visited Wever's lab in November 1971. Von Bekesy asked Wever to recommend a good candidate to come work with him at the Laboratory of Sensory Sciences in Honolulu. Von Békésy told Dick that Wever didn't hesitate more than a second to name Dick Fay (...or "so Dick says" according to Cathy!). On November 23, the day before Thanksgiving, Dick asked Cathy if she would like to move to Honolulu. By December 28th, the Fays had sold their cars, furniture, and utensils and happily settled with their 2-year-old son Christian into a great location in Honolulu, HI (all within 5 weeks!). The Fays moved to the bottom floor of a large house almost two-thirds up St Louis Heights on the edge of the Manoa Valley with a panoramic view of Waikiki Beach and the University of Hawaii-Manoa. According to Cathy, their back yard was replete with mangoes, lemons, papayas, guava, and passion fruit; it was so beautiful "they thought had died and gone to heaven." Dick settled into his research in von Békésy's Lab working on crayfish at von Békésy's behest and eventually published two of Dick's only papers on invertebrates, one on the multisensory interaction in control of eye-stalk rotation response in the crayfish (Fay 1973) and the other on the dynamic properties of the compensatory eye stalk rotation response in the crayfish (Fay 1975). Unfortunately, von Békésy died on June 13, 1972 less than 6 months after Dick joined von Békésy lab. There was a "silver lining" to the time spent in the von Békésy's lab, Dick met Art Popper. Dick was thrilled to meet and work with Art Popper who joined the Laboratory of Sensory Sciences shortly after Dick began working there. Dick and Art were kindred spirits with like minds and as many of us know eventually lead to great collaborations (as they say "the rest is history"). The Fay and Popper families became very good friends and as Cathy reminisced "the two families spent many great times together at University of Hawai'i parties, eating at Honolulu restaurants, and enjoying Passover Seders at the Popper home, and the Fay family loved every single minute of their Honolulu years."

During his time in the Laboratory of Sensory Sciences, Dick and Art went on a now rather famous trip in 1972 to the Enewetok Atoll, which had a mean elevation 10 ft above sea level. Dick said that when he was not working he was either eating or watching a movie with the 40 other government employees on the island. The native Enewetokians had been evacuated and relocated because of the fallout from nuclear tests (a total of 43 nuclear tests were conducted on Enewetok from 1948 to 1958). During their stay on the atoll, Dick and Art witnessed the birth of four baby sharks in the lab pool and they managed to catch other sharks by hook and line to do some basic research on shark hearing. It was from this early collaboration that they were able to publish one of their first papers together from their work on Enewetok (Fay et al. 1974).

After Von Békésy passed away, members of the von Békésy Lab tried to continue their NIH grant without von Békésy but their efforts were not successful. After that in 1974, Dick and the family moved to North Carolina where he took a position as an assistant professor at Wake Forest University in the Bowman Gray School of

Medicine located in Winston-Salem, NC. At the Bowman Gray School of Medicine, Dick joined his friend Jim McCormick in the Otolaryngology Department where Dick worked on writing grants and interviewing for a full-time faculty position. According to Cathy, she was not particularly enamored with the South and wanted to leave as soon as possible! As Cathy mentioned “any place after Honolulu would be a difficult adjustment at best.” During his time in North Carolina, Dick interviewed at Rensselaer Polytech in Troy New York and at Loyola University in Chicago. Cathy said that she read that Chicago was the best place for a woman to find a job and that they would be moving to Chicago!

Soon after interviewing for full time faculty positions, Dick was offered a position as an Associate Professor of Psychology at Loyola University Chicago. Three months after leaving North Carolina, the Fays settled in Winnetka, IL and Dick began his faculty position at Loyola University Chicago where he would spend the next 36 years of his career. Cathy happily took a position at GD Searle Pharmaceutical Company and then later became Editor-in-Chief of the Travel Division at Simon & Schuster in Chicago. A few years later, Dick and Cathy had their second child Amanda Hutchinson Fay who was born in April of 1979. Memorable highlights for the Fays included their hosting the annual Psychology Picnic in their backyard which continued for many years until the department grew too large and then the picnic had to be moved to a much larger, real picnic ground. While at Loyola University, Dick taught Physiological Psychology, Neuroscience and Statistics. He often mentioned that he very much enjoyed teaching students and that he preferred to teach rather than buy out of such responsibilities. Perhaps Dick greatest love at Loyola University Chicago was being part of the Loyola-endowed Parmly Hearing Institute. According to Cathy, Dick enjoyed every one of his days there working in his spacious lab and he was enormously fond of his highly respected and eminent colleagues, Bill Yost, Sheryl Coombs, Rich Bowen, Bill Shoffner, and Toby Dye.

Later in the mid 1990s, Dick began to take his research “on the road” and work as a summer scientist at the Marine Biological Laboratory (MBL) in Woods Hole, MA. He brought his “shaker system” to the MBL and continued many years of experiments with Peggy Edds-Walton, Steve Highstein, David Zeddies, and Joe Sisneros. In 1993, Dick and Cathy bought a big old barn on “Shearwater Farm” about a mile down the road from the MBL, and as Dick says, he put a lot of “sweat equity” into it over the last 22 years bringing it up to snuff (as well as up to code)! This research arrangement seemed to be ideal for Dick where he could teach and perform his goldfish hearing research in Chicago during the academic year and then spend the warm summers on Cape Cod with his family at their home in Falmouth and work at the MBL on toadfish hearing research.

Another side note about Dick is his love for art. No picture of Dick Fay is complete without acknowledging his abiding love and keen interest in art. His particular interest is in the moderns. Cathy says that he has an incredible memory for every detail of every artist’s life and work and can expound on every artist and their contemporaries. Cathy says Dick has provided her with many art lessons for her to cherish throughout her life.

In 2003, I was first introduced to Dick by his former postdoc David Zeddies while David and I were both Grass Fellows at the MBL. I was initially very nervous to meet the “great fish auditory physiologist” Richard Fay. I had read all his papers and was especially interested in his earlier elasmobranch hearing research with Art Popper. After initially meeting Dick, I was quickly put at ease when I realized how easy it was to talk with him about research and science in general. Right away we started to discuss possible projects regarding sound source localization with the “west coast toadfish,” the plainfin midshipman. The following year David Zeddies, Dick Fay, and I set off to the UC Bodega Marine Lab in California to investigate the plainfin midshipman and sound source localization. We later successfully wrote an NSF grant to support our Bodega research on sound localization, which eventually led to four coauthored publications on the topic (Zeddies et al. 2010, 2011, 2012, Coffin et al. 2014). During this time, David and I looked forward to our annual “Bodega research adventure” with Dick. I had some of the best times of my science career working with Dick and David during those summers in Bodega. As Cathy once mentioned not only did Dick find the yearly trip to Bodega Bay to work with the “midshipman” invigorating, he also loved the beauty of the area and the fabulous meals they all managed to cook while “roughing” it.

In 2008, Cathy retired and started a hobby that turned into a small business that resulted in her building an arts and crafts studio on their Shearwater Farm. Her shop is full of all kinds of paintings along with decorated rugs, trays, boxes, and wastebaskets. As Cathy put it, her hobby/business “became a nice way for her to calm down and adjust to retirement after 20 deadline-driven years in the publishing business.” In 2011, Dick joined Cathy in retirement and they both spent time travelling to Brazil and Ecuador to visit their daughter Amanda who was teaching in Quito. In April 2013, while on vacation in Brazil Dick suffered a stroke and he is now steadily improving and slowly regaining all his faculties. In 2014, the Fays spent 3 winter months in Old San Juan Puerto Rico enjoying the warm weather and not missing the very cold winter that gripped New England that year. They are definitely making plans to go back soon. Cathy tells me that Dick is feeling good about his career and in retirement is now happy to pursue writing a children’s book on Hearing in Goldfish. I hear that Cathy is also very happy in retirement editing and illustrating his recent work. At this point in his life, Dick says he has some good advice that he would like to pass on: “Listen to Art Tatum, a genius jazz pianist whose music will amaze your mind and soothe your soul. Start with “Deep Night.””

Many thanks to Cathy Fay for sharing much of the information presented here that allowed me to tell you about Dick’s “other side.” Best “fishes”!

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