

My Career as a Separation Scientist: Part I-3 (Updated on 10/3/2020)

For those interested in learning about a foreign-born separation scientist's mundane life of carving out a career in the American industry, here are a series of articles that may be worth reading. These articles are of particular interests to:

1. Analytical chemists and separation scientists
2. Those interested in the pharma industry and drug development, technical writing, and working as a consultant
3. Those interested in coming to America as an international student (e.g., from China or Hong Kong) and about living in suburban America



This is a 3-part series of articles on the mundane life of a foreign-born separation scientist coming to America as an international student and eventually carving out a career in many industries. It chronicles my early interest in writing, leading to many books and articles in analytical chemistry and separation science. Each article is ~20-30 min read.

My Career as a Separation Scientist: Part I (Early Childhood, High School, and College)



“If people cannot write well, they cannot think well...” – George Orwell

If this saying is true, then I should be a thinker as I have written four books and over 130 journal articles. Perhaps, writing is in my genes since our family came from the city of Ningbo, Zhejiang Province, China, a place that has a history of producing many famous writers, artists, merchants, and politicians.

Shanghai and an Introduction to Ningbo (with a list of celebrities)

I was born in the City of Shanghai during the ‘Fall of Shanghai’ in 1949. My mom told me that I was a ‘late’ baby, and the People’s Liberation Army was shelling the city's perimeter the night I was born. We lived in the French-occupied district, and the midwife had to climb over the gate to have me delivered since there was a curfew. I often wondered what would happen if she decided to go home instead. The next

morning, my mom found the Liberty Army sleeping on the sidewalk wearing straw shoes. The citizens were not disturbed.

Our ancestors came from Ningbo, a coastal city 140 miles south of Shanghai, whose early residents came mainly from Ningbo. The Ningbo dialect was the predecessor of Shanghainese. Few foreigners are familiar with this remarkable city, which currently ranks number #4 as the world's busiest ports after Shanghai, Singapore, Shenzhen, and #7 Hong Kong. I found it fascinating that my roots are intimately tied to some of the world's busiest ports (#1, #4, #7, and #23 New York City).

Ningbo produced many celebrities who are well-known in China and the world, such as:

1. **Jin Yong (金庸)**: #1 novelist in China who pioneered 'kung-fu' novels. He is universally adored as a writer, and perhaps the most popular Chinese novelist bar none.
2. **Yishu (亦舒)**: The most successful romantic novelist of Hong Kong who authored 300 paperback novels. I am a big fan of her novels and particularly her business model of making tons of monies by writing. My friends often laughed at my choice because she is not respected as a novelist with much intellectual depth.
3. **Chang Kai-Shek**: A protégé of Dr. Sun Yat-Sen, the founder of the Republic of China and the general and ex-president of China who lost power to Mao Zedong and the Peoples' Liberation Army in 1949.
4. **Zhou En-Lai**: the diplomat and premier of China under Mao and the architect of the Ping-Pong diplomacy in 1971 to open up China during the Nixon administration.
5. **Tung Chee-Hwa (董建華)**: A shipping tycoon and the first chief executive of Hong Kong after the British handover of the city from the United Kingdom to China in 1997.
6. **Yo-Yo Ma**: The world-renowned cellist and the son of the famous violinist Hiao-Tsiun Ma who pioneered playing Chinese tunes with western orchestra such as '*The butterfly dream lovers.*'

7. **Run Run Shaw (邵逸夫):** Producer and founder of the early film studio Shaw Brothers of Hong Kong. He is perhaps the most influential and famous producer in early Chinese filming history. We grew up watching his film. He died at the age of 107.
8. **Stephen Chow Sing Chi:** The famed filmmaker and actor from Hong Kong who produced '*Shalin Soccer*' and '*the Mermaid*.' I am not a fan of his films whose crude humor I fail to appreciate.

Early Education and Life in the British Crown Colony of Hong Kong

I am the fifth child from a family of seven siblings. The family emigrated from Shanghai to Hong Kong as refugees when I was two years old. My mom traveled three days by train with all her possession and four of her young children to join my Dad there. She had to leave my second brother behind in Shanghai because she could only take care of 4 children while traveling (I was strapped to her back while she would hold my first brother in one hand and all her luggage on the other; my two older sisters would be walking behind her hanging onto her shirttail). We rented a single room to carve out a living in the British Colony full of struggling refugees from Mainland China. There were no toys in my childhood, and I displayed an early affinity for writing when I requested my mom to buy me papers and pencils to learn ABCs at the age of three.

Moving on

When I turned five, our young family added two more members (my younger brother and the kid sister), and we moved into a 700-square feet 3-bedroom apartment in Kowloon City. We had a real kitchen, running water, our own flush-toilet bathroom, and a large balcony overlooking a wet market. Initially, we rented the two extra bedrooms to two single men who worked with my father as artists. The apartment was right in the descending flight path of the newly built Kai-Tak Airport, and we would see many planes with their extended landing crafts roaring overhead at all times of the day. Living arrangement for the large family was tight, and my brother and I would share a canvas

cot set up in the living room every evening for a few years until we had our own bunk bed in a bedroom vacated by the renter.

I looked back with fond memories of my childhood years from 5 to 19, growing up in the top-floor apartment until I left for America. We were not rich by any global standard though life was exciting and fun in our large family. My parents from Shanghai, who hardly spoke Cantonese (local dialect), managed to provide a decent environment for the seven siblings. Our living conditions were infinitely better than those later refugees who lived on our building's rooftops in tin-roof sheds without running water.

Surviving and Thriving the Education System in Hong Kong

I was a product of the British Educational System catering to the academical elites. Elementary school was first to sixth grade, High School - 7th to 11th, and Matriculation Class for those college-bounds was 12th -13th. There was only one university (The University of Hong Kong or HKU) at that time, which could accommodate ~2% of the student body. Entrance to the better high-schools (the best ones were subsidized parochial schools run by Churches), and the single university was by competitive public examinations at 6th and 11th grade. All the kids studied hard to have a chance for a better life. Otherwise, they might wound up toiling in a sweat-shop factory making 'ninja turtles' for the rest of their lives.

There was little pretense of democracy in Hong Kong under the British Empire. The Brits were the over-lords, and the other 98% of the Chinese residents were all second-class subjects. The majority was living in abject poverty (under 2 USD per day). A grocery worker's regular working hours were 12-14-hour days, seven days a week, with two days off during the Chinese New Year. There were no welfare, social security, or safety net for the huddled mass living in deplorable sheds or tiny apartments.

I skipped kindergarten at age five and went straight into a free Buddhist elementary school. We did Buddhist chanting during morning assemblies. I was an average

student in the first few years, and there was plenty of homework even for a young child. My mom took good care of her many children but was no 'tiger mom.' She was upset and complained about the teacher giving excessive homework when she saw me working late at 11 pm in the third grade. Empathy or not, I still needed to complete the assignment that late evening.

I enrolled in a Jesuit Catholic School (Tang King Po) by repeating the 4th grade and started to shine academically, placing second-place in a class of 40 students in grades 4th and 5th. We sang hymns every morning and attended religious classes and masses. My mom, who had a second-grade education, was always pro-active in the academics of her off-springs. I recalled receiving a cash prize of 5 HK\$ from my mom as an incentive for being second place in my class. The incentive was a considerable sum as our daily allowance was 10 cents a day, which hardly supported any habits such as a movie ticket, soda pop, or ice popsicle. Still, we were taught to be thrifty and encouraged to save monies in a piggy bank provided as the Hang Sang Bank. I was a miser in those days as all Chinese youths were masters in delaying satisfaction in preparation for a better future. In contrast, my big brother always ran short at the end of the week and resorted to borrowing from the siblings.

My mom took an interest in my exceptional academic ability and wanted me to get into a better parochial school. She hired a paid tutor though the family could hardly afford the extra expenses. She also made a risky move and deliberately placed me for one year at a Government School for sixth-grade (Li Cheng Uk School located in the poorest resettlement districts of Kowloon). The benefit was better preparation for the upcoming public entrance examinations to the more selective high schools. It was an unusual move though I came in first place in my new sixth-grade class.

During elementary schools, emphases were placed in writing (including Chinese calligraphy by small and large brushes with permanent carbon ink) and writing compositions. I recalled for the Public High School Entrance Examination, the composition test was to write three two-page articles in 90 minutes (themes in

informative, argumentative, and creative writing) with titles selected from three given options in each category. This format was repeated for English and Chinese languages, which were required subjects to pass for the graduation of an elementary school in Hong Kong.

Towards the end of the sixth grade, I was busy taking additional entrance tests from other high schools just in case I did not place well in the public exams. I applied to six high schools and managed to get accepted to all of them, including the Pui Ching Middle School, the best Chinese School, who accepted 24 out of the 1000 applicants that year. I was the envy of our next-door neighbor, who worked in a large publisher with three girls and a single boy, who applied to the same school but did not do well in the entrance exam.

Diocesan Boys' School (DBS, Grade 7th to 13th)

In May of 1960, every sixth-grader was anxiously waiting for their fate when the Sing Tao Newspaper published a massive list of students' names and their assigned high schools. My mom's risky plan apparently worked well, and we were elated to find my name in the list of the most selective High Schools in Hong Kong (Diocesan Boys' School, 拔萃男書院). The prestigious school was founded in 1869 by the Anglican Church of England and had an excellent reputation in academics, arts, music, and sports. We had a statute of Dr. Sun Yat-Sen (孫中山), the founder of the Republic of China, who overturned the Qing Dynasty in 1911. He was a former DBS boy for just a few months and clearly the most famous alumni.

DBS was located in Mongkok at a vast campus on top of a flattened hilltop, which was nicknamed Mt. Olympus in the school magazine. It had a beautiful campus with a full-size, grass-turfed soccer field surrounded by a 400-meter running track. DBS eventually built an Olympic-size swimming pool after I left there in 1968. I usually walked one mile along Boundary Street and climbed a long flight of 192-steps. I did this journey four times a day to save monies by going back home for lunch.

I spent a total of seven years at DBS from Form 1 to Form 5 (high school) and two years of Matriculation Class (Lower Six and Upper Six Science). We started to specialize in Science, Arts, or General (business) in Form 4. I selected Science. By the time I finished Upper Six, I had four years of Chemistry, Physics, and Pure /Applied Mathematics. Taking SAT or Achievement Tests in Chemistry and Physics to enter US College was considered an effortless task. My weakest subject in Achievement Tests was English Composition, where I score 460/800 or about 50% percentile. It was still tough for a non-native person to excel in a foreign language.

An Accident with Chlorine Gas

I acquired a serious chemistry set from my sister's boyfriend and had a hobby of making various gases such as hydrogen and chlorine in our kitchen during a few Sundays at Form 5. I learned the concepts of limiting reagent, stoichiometry, and calculating the volume of gases by trapping the poisonous chlorine gas in an inverted measuring cylinder filled with water over a bubble plate. I was quite confident and knew what I was going in the 10th grade. Something went wrong that Sunday since I found chlorine gases still spewing out from my reaction after filling all my trapping jars. I made a split-second decision and did three things immediately. I opened the kitchen window, turned on the faucet to run water over the brewing flask (conc. nitric acid and potassium perchlorate) to kill the reaction, and evacuated from the room. I held my breath during that time but still managed to have a good whiff of the poisonous greenish gas. I thought I was going to die panting on the sofa. I managed to survive, told no one of the accident, and vouched to double-check my calculation from now on.

During the first year at DBS. I played catch-up and struggled with my English Language at Form 1 since all classes except Chinese were taught in English. I remembered that the book's first page for my Biblical Study class called 'The Chosen Race' was half full of unfamiliar words. My pocket English Dictionary was very worn after Form 1 from overuse.

Later on, I progressed well, going from Form 1C, 2B, 3A, 4A, and 5A with the A classes for the better students academically. We later found out that most of the 'A' students eventually worked for the 'C' students because the less successful students would excel better in the business world.

A Broken Arm in the First Year

I managed to break my forearm in the first year while playing soccer. It was a freak accident during a slight drizzle, and I was trying to score a goal when I slipped on the slippery turf and stumbled. When I got up, I found my left forearm broken with a z-shaped overlap. There was no pain, and I was taken to Kowloon hospital, where I stayed two nights to recover from an open reduction surgery. The operation seemed to be performed by an intern because it left two considerable scars in my forearm. The next three months found my left arm in a full cast resting on a sling, which lasted from April to July of 1962. It was actually manageable since it was my left arm, and I could resume normal activities and studies. I received a lot of extra attention and sympathy and learned how to manage everyday life in these few months.

Early Promises as a Writer at the 8th Grade or Form 2B?

The teaching staff at DBS were generally outstanding. In Form 1, an Art teacher taught us the concept of a two-point perspective, and a music teacher who taught us to sing various songs in their original German, French, and Mandarin languages. My Chemistry interest was inspired by my first Chemistry teacher, who taught us with great enthusiasm for the art and science of performing a quantitative titration using a burette.

There were many notable exceptions. One Chinese teacher we all remembered well was Mr. Kang. His uncle was a very famous scholar, philosopher, and politician, Kang Yüwei (康有為), much responsible for the May-fourth Reform Movement at the end of the Qing Dynasty. Every lesson, he would mention his famous uncle at least twice without fail. All the kids would secretly laugh behind him though he was a

knowledgeable scholar in ancient Chinese text and language.

One incident I remembered vividly of Mr. Kang was the remark he wrote at the end of one of my compositions on the devastation of Typhoon Wanda to Hong Kong in 1962. I guessed he liked my writing style and the content but did not care much of the tepid ending. So, Mr. Kang wrote (江郎才尽) which came from a parable of a very talented scholar who did not have a promising career because he had used up his talents. I was secretly pleased with the accolade coming from a severe teacher, albeit the negative intonation since the piece did run out of steam towards the end.

Joining Boys Scouts in the 9th grade

DBS had an active Boy Scout Troop (the 6th Troop of Kowloon), and I was sworn in as a Tenderfoot during the 9th grade. Before joining, everyone must read 'Scouting for Boys' by Robert Baden-Powell, the founder of the organization who made his fame during the Boer's War by Britain in South Africa. I was paired with a senior scout who trained me in the history of scouting, the organization's goal, and the safe use of an axe and knife. I learned how to recognize the various trees around the school campus like mountain pines, banyans, willows, oaks, and shadow trees. I was a curious kid and soaked up all these interesting facts with enthusiasm. Before long, we planned our first overnight camping trip where practiced the skills of packing a rucksack, pitching a ridge tent on a groundsheet, handling an axe to cut firewood, lighting a fire, digging latrines, building a kitchen fire pit, cooking meals, and washing dishes with running water from a brook.

We always wore a full uniform with a beret, leather belt, shorts with long venturing socks, scarf, and all kinds of colored patches, insignia, and badges. We carried a staff when camping or hiking. The Boy Scout Association was a para-military outfit, and we were no symbols of 'coolness' even in the 1960s and were often jeered by neighborhood kids. Nevertheless, the opportunities for a 14-year city dweller to go camping and see millions of stars in a pitch-black night and the smell of burning woods

provided endearing memories that made up for these funny looking uniforms.

I learned many useful life skills from my five years of Scouting such as cooking, sewing, tying knots, swimming, camping, and other hobbies/sports such as map reading, using a sighting compass (backtracking your own location by triangulation), rock climbing, astronomy, fire-fighting, meteorology, and basket weaving. I could tie a rope around my waist with a single wrist action in five seconds. My best knots were the 'packers,' the fisherman, and the hangman knots. I became a more self-reliant teenager, if not a better leader later in life through my Boy Scouts training.

I am often saddened when I read the news in recent years on scouting being dominated by lawyers soliciting businesses for sexual abuses in the Boy Scout Organizations. I am convinced that there are some bad apples in any organization. However, our society's obsession with social injustices and the relentless pursuit of monetary compensation often painted an imbalanced portrait of some of the best-meaning organizations. No one appeared to want to speak up for the Scouting organization's benefits and its lofty goals to promote good deeds, self-reliance, love of nature, and public community service by the American youth.

Extra-curricular Activities (Music and Sports)

DBS wanted to educate young boys to be all-rounded adults to excel in academics, sports, arts, music, and other activities. It promoted competition using a house system, internal competitions, clubs, and extra-curricular activities. The track and field stars were revered as the true heroes in the prestigious school. Every year in spring, we would travel across the harbor to the enormous Hong Kong Stadium with a 30K-seating to root for our school teams in all three age-groups (Grade A, B, and C) for the Interschool Athletic Competition Finals. DBS often emerged the Grand Champion in all three categories. Our archrivals were La Salle College (a Catholic high school) and King George V High School, catering to kids from English parents or international students.

Other highlighted events were the Interschool Swimming Competition, Music Festivals, and the annual School Fete for charity fundraising.

I was not a strong athlete though I participated reasonably well in sprints and breaststrokes. My best time for a 100-m sprint was 12.9 s with paled in comparison with the record set by our 6'3" superstar William Hill of 10.8 s who ran in the Asian Games later on. With great sadness, I learned of William's untimely passing from our Old Boys' WhatsApp group in July of 2020.

Starting a Diary at the 10th grade or Form 4

In 1964, I bought a diary and regularly wrote a daily journal in both English and Chinese. I found the process fulfilling as it allowed me to record my inner feelings and mundane happenings of the days, which included some insights or discoveries. Unfortunately, the excellent habit only lasted about one year. Nevertheless, the good feelings towards writing and the joy of a finished creative product was somewhat ingrained in my mind.

Religion, Book Club, and the Hong Kong Youth Council

During my Lower Six year, I started to attend weekly religious services on Sundays and participated in the youth group retreat of the church I visited. I was never a religious person but had the unique opportunities to attend schools affiliated with Buddhism, Jesuits, and the Anglican Church. I have studied the Bible for seven years and was familiar with the Old and New Testaments. I was intellectually curious about religion and wanted to learn more. I never found my religious calling or took the leap of faith and considered myself more agnostic or humanist.

Since the 7th grade, I started going to the library at the Hong Kong side every two weeks to borrow books on science, nature, novels, and subjects that captured my fancy. One book I adored was "The Psychology of Adolescence." In the same year, I also started

tutoring younger students for pay up to twice a week. I commanded an excellent salary since all parents liked to have private tutors from very selective schools. In the 10th grade, I started German lessons at the Goethe Institute associated with the German Embassy. This lasted for about one year.

From 1967 to 1968, I became quite intellectual curious and participated in book clubs to discussed books and social issues. One of the books that sparked interest was called “Hong Kong: Borrowed Place and Borrowed Time” by Richard Hughes. The book described the awkward political situation and the past, present, and future of Hong Kong. It was a topic rarely discussed openly, and this eventually led to a Youth Conference interested to promote a better understanding of social issues. Afterward, many of these like-minded youths decided to form a group called ‘the Hong Kong Youth Council’ to promote their peers' social consciousness. Our first project was a survey to measure social consciousness using a questionnaire. Later on, the Youth council signed onto a debate/discussion forum sponsored by the Hong Kong Radio Station. I recalled I participated as a panel member on a debate at Wah Yan High School on the topic of “Should Chinese be recognized as an official language of Hong Kong.”

All these activities sparked my interest in sociology and social welfare, which prompted me to enter as a sociology major if I were to be accepted by HKU.

Those high school years were undoubtedly educational, multi-faceted, busy, and formative to the kind of adult that I turned out to be later.

A Major Decision and Crossroad for College

I managed to get accepted to all three universities I applied to (HKU, U. Minnesota at Minneapolis, and Brooklyn College). The final choice was Brooklyn College since my big brother was already in New York, and I qualified for free tuition there as they accepted only 16 international students that year. On August 26, 1968, I took a 43-hour plane trip on a Philippine Charter flight to New York City (stopping in Taipei, Manila, Wake Island, Hawaii, San Francisco) and transferred to an American Airlines flight to

New York City. My big brother picked me up at JFK Airport, and I started my new journey in America with a welcome banquet at the '4-5-6' Zhejiang restaurant in New York Chinatown near my brother's cockroach-infested apartment on #9 Eldridge St. I had a one-week vacation in New York City riding the 15-cent subway everywhere. I visited all the tourist sites (Statute of Liberty, Radio City Music Hall, Empire State Building, the Bronx Zoo, Aqueduct Racetrack, and Coney Island).

The following week, I reported to Brooklyn College as a freshman at the age of 19. I recalled I took English Composition, a required course in the first semester. My instructor was a serious and very conscientious lecturer called Mr. Friedman. He liked my thought process, but always marked my grade a 'C' due to my English grammar weakness. The best I had done in his class came with my last homework assignment when I wrote on "Civil Disobedience." I got a grade of 'B' for the piece, and he wrote that I had a good head, but grammatical errors marred the writing. My final grade was still a "C."

I supported my entire 3-year undergraduate study in chemistry by working weekends and summers at Chinese restaurants during freshman and shoe salesman at Bedford-Stuyvesant, a black ghetto in Brooklyn. I also took on a part-time paying job on Sunday mornings, teaching English to new immigrants in the New York Chinatown Planning Council on Division Street.

My three years at Brooklyn College, resulting in a BS in Chemistry, went by quickly. College in America was more manageable in comparison to the more demanding high school curriculum in Hong Kong. I recalled I paid \$50/years of healthcare insurance as an international student with no immigration status and enjoyed the best health care ever without any copays for doctors' visits. I shared a rental apartment near campus with another international student and had my own bedroom with as much heat in the winter for my share of \$40/month. I pulled in an average of \$3-\$4K a year of income, which was sufficient to finance my studies with free tuition and living expenses. Those were the good old days of the 1970s and 80s when Americans enjoyed an

unprecedented global leadership in technologies, wealth, and living standards unrivaled by any other countries in the world.

It was also no accidents that Hong Kong has prospered from the collective tears and sweats of the millions of Chinese refugees swarming this tiny colonial fish village. In a few decades, the combination of traditional work ethics, free-wheeling capitalism, and the British attention to discipline and management systems somehow transformed this overcrowded shantytown into a vibrant financial center in the world.

My Career as a Separation Scientist: Part 2: *Graduate School and Early/Mid-Career*



This article is the second part of the series on 'My Career as a Separation Scientist,' which chronicles my childhood in Hong Kong, arriving in America as an international student, and eventually carving a career as a separation science. I started writing at an early age and progressed to technical writing in analytical chemistry and separation science.

What is Analytical Chemistry and Separation Science? *(Skip this part if you are a chemist!)*

Perhaps I should start with a few words on chemistry and separation science to those less familiar with the topics.

Chemistry is considered a fundamental science for the study of matter and its interactions. Chemistry is generally divided into physical, organic, inorganic, biochemistry, and analytical chemistry. Analytical chemistry is the scientific study for

measurement, particularly on the levels of essential components in a mixture. It is considered an applied science to support research, product development, and quality control. Analytical chemistry primarily relies on two techniques called spectroscopy and chromatography.

Spectroscopy uses the interaction of matter with electromagnetic radiations (ultraviolet, visible light, infrared, sound, X-ray, NMR, etc.) to evaluate the identity or measure the amount of a component in a matter. Chromatography is a separation science where a mixture is physically separated into its constituent components by interacting with absorbents packed into a column. The separated components are then detected for either identification or quantitation. Chromatography can be carried out in the liquid phase or gas phase called liquid chromatography (LC) or gas chromatography (GC), respectively. If an electrical current is used in the separation, then it is called electrophoresis. Mass spectrometry (MS) is considered to be a spectroscopic technique and a pivotal information-rich detector for chromatography, in which ionized components are separated in a high vacuum by their mass/charge ratio, allow highly-accurate determinations of molecular mass.

About sixty years ago, high pressure was used to improve LC's efficiency, and the technique is called high-pressure liquid chromatography or HPLC. It quickly became an indispensable analytical chemistry technique for pharmaceuticals because of its widespread utility and accuracy. HPLC equipment's market size is currently only about \$6 billion (the size of the Apple watch), its impacts critically on the entire pharmaceutical industry with market size of over \$1 trillion. Under the current regulations, no drug products can be marketed without the HPLC's quality control testing to ensure their safety and efficacy.

The combination of HPLC and mass spectrometry (MS) or HPLC/MS, is becoming the most powerful and widely-used technique in researching complex samples, particularly for bioscience research and clinical diagnostics. This combination of two analytical techniques is often touted as 'the perfect marriage,' which allows the quantitation

(measurements) with trace components easily in very complex samples often found in natural environments (e.g., pesticide residues in food, blood, and biological tissues).

Graduate School at Graduate Center (the City University of New York, CUNY)

In the Fall of 1971, I started research at Brooklyn College as a summer intern in my senior year in a radiochemist lab, followed by enrollment at the Graduate Center in the City University of New York (CUNY) in analytical chemistry. I was concerned about the lack of job opportunities in radiochemistry and decided to switch my specialization field to chromatography in my second year of graduate school. High-pressure liquid chromatography (HPLC) was emerging as a dominant analytical technique at that time, and this decision proved to be a wise choice later on in my career development. The subject of my research was environmental chemistry on ‘the chromatography of polycyclic aromatic hydrocarbons (PAHs) in suspended air particulate matter.’ PAHs are potent carcinogens implicated in the etiology of human lung cancer in cigarette smokers. These compounds could be a supplemental factor for those exposed to air pollution. PAHs are ubiquitous as trace pollutants in the environment since they are formed by ‘pyrosynthesis’ during the combustion process and can be found everywhere in sediments, waste oil, BBQ foods, and cigarette tars.

My thesis was conducted in collaboration with the New York City Department of Air Resources, whose laboratory was located in the Cooper Union building in Manhattan. I worked weekdays and most weekends with a single-mindedly focus on completing my thesis as soon as possible. In 1976, I published my first paper in *Analytical Chemistry*, my only publication in this prestigious journal. It was a good start, and here is the full reference:

“M. W. Dong, D. C. Locke, and E. Ferrand, *HPLC method for routine analysis of major parent polycyclic aromatic hydrocarbons in suspended particulate matter*, **Anal. Chem.** **48** (2). 368-372, 1976”.

In the years I was in graduate school, we stayed in several apartments in Brooklyn and Queens in New York City. The last few years of graduate school were spent in a 2-bedroom railway apartment in the Williamsburg district of Brooklyn. Our rent was

\$130/month, including heat, utilities, and maintenance. The location was close to a subway station, a few stops from Manhattan by the 'L' train. Across the street was a Boar's Head factory with trucks and activities in early mornings. It was an older building with minimum amenities with sounds of rodents running inside the wall. However, rent was inexpensive and befitting for a student. As time went by, we moved to larger suburban housing in quiet neighborhoods, resulting in escalating costs and massive time commitment. Life is always a compromise of pros and cons.

Summer Intern at Naylor Dana Institute (Valhalla, New York)

In the last summer of graduate school, I was an intern at the Naylor Dana Institute for Disease Prevention (The American Foundation) at Valhalla in Westchester County, New York. I worked under Dr. D. Hoffmann, responsible for the data used in the 1964 Surgeon General's Report on Tobacco and Health. The institute was well-funded by research grants from the National Cancer Institute (NCI) and the U.S. Department of Agriculture (USDA). It had 30 organic and analytical chemists working in the 'Department of Environmental Carcinogenesis' focusing on tobacco and health research and the effects of environmental carcinogens in the etiology of the most common human cancer (lung and colon).

One of the department's accomplishments was the identification of Nitrosornicotine (NNN), a unique tobacco-specific nitrosamine (a potent class of carcinogens), which is formed during the curing process of tobacco leaves from the reaction of nicotine with nitrites. I recalled the department recorded a level of 90 ppm in a sample of chewing tobacco. Its use was often associated with esophageal cancer. This high level of nitrosamine unheard of for nitrosamines in the environment. I was a 'sponge' and learned a lot about research and related analytical chemistry in a vibrant and collaborative environment. Every time a paper was accepted, the first author would bring in dozens of donuts to celebrate the publication. This tradition turned into a great motivator for all the scientists to publish.

I lived in an apartment in Brooklyn and purchased my first car – a 5-year old used Buick Skylark with a V-6 engine for the daily 30-miles commute to the institute in Westchester country. During that time, I published six technical papers as a summer intern, and later on as a post-doctoral research fellow. I applied for a grant at the National Institute of Environmental Health Science (NIEHS) and was elated when it was accepted and funded. Regrettably, I left the institute before I was able to execute this funded grant.

Celanese Research Company, Summit, New Jersey (First industry Job)

I had an annual salary of \$12,500 as a postdoc research fellow but thought I could have done better in industry. My first industry job prospect came from a headhunter, and I received a job offer for \$23,000 from Celanese Research Company in Summit, New Jersey (NJ). In January of 1978, my wife and I moved to Summit, NJ, where I became a research chemist, a section head of the separation group, with three technicians as direct reports. Celanese Research Company was the research branch of Celanese Corporation. Celanese was the sixth-largest chemical company in the US, and it had an annual sale of \$2 billion at that time. The lab had ten gas chromatographs (GC) and two new HPLCs (One Varian Syringe pump system and a brand-new Perkin-Elmer Series 3B). It was a busy lab supporting various business units in specialty plastics, chemical catalysis, and biotechnology. The separations lab did about 8000+ analyses of acetaldehyde each year to support the polyester bottle resins (used for 1 and 2-liter soft drink bottles as those used by Coca-Cola and Pepsi). As a result, I published two papers on headspace gas chromatography.

In the first year, we rented a 2-bedroom apartment in a 2-family house in Summit and bought our first new car, a Pontiac Grand LeMans, for \$6k. The quality was so low that I immediately took it to the dealer to fix many issues upon delivery. Our combined annual income was ~\$35k, and we felt rich as an average single-family house in the affluent Town of Summit sold for only \$50-60K at that time. We bought our first single-family house and had our first child during those three years at Celanese.

Owning a house and raising children in America was a tough balancing act for a dual-career family. My wife was working in New York City in the banking industry and commuted there from New Jersey, albeit a very long working day. Our total mortgage payment, including tax, was \$600/month, and a week of full-time childcare was \$40/week. We felt well-off at that time because health care was totally free. Years later, even as our income kept rising, we never felt as rich as we were in the early 1980s' since the income was hardly catching up with the rising cost of housing, taxes, and health care. I believe that America epitomized the world's unprecedented leader in technologies, personal freedom, and standard of living after the second world war to perhaps the 1980s and 1990s.

Owning a house in America could be a rewarding but challenging undertaking for a first-time owner. We made frequent trips to many department and hardware stores to equip our 3-bedroom, 1.5-bath, 1-garage, split-level ranch-style house on a ¼ acre property in New Providence, NJ. Soon, our half-basement was packed full of stuff. Since I had an easy 3-mile commute to work, most household chores and chauffeuring fell on me, and I spent countless hours cooking, cleaning, and performing home maintenance tasks for the first time. There was a giant oak tree on my property, and I developed a severe case of allergy to tree pollens in the first season.

Nevertheless, life was good for a suburban professional with a decent job and plenty of freedom. However, I was not happy running a support lab and dealing with customers' issues all day. I yearned for a more fulfilling career and learning opportunities. I soon received another call from a headhunter and accepted an offer as a Sr. Application Chemist with the Perkin-Elmer Corporation in November of 1980.

Early Career at Perkin-Elmer (Norwalk, Connecticut)

The relocation package from Perkin-Elmer was substantial, which included a third-party buyout of my house purchased only two years ago. In 1980, Perkin-Elmer was voted as one of the five best-managed companies by Wall Street. Sales hit \$1 billion, and the

company achieved a ranking of Fortune #280. It was a market leader in four high-technologies: analytical instruments, optics, microlithography, and 32-bit minicomputer. Perkin-Elmer introduced the first infrared spectrophotometer (debuting the analytical instrument industry) in 1942 to support the emergency war effort to make synthetic rubber by the American Cyanamid Corporation after the occupation of Malaya by the Japanese, which nearly cut off the supply of rubber to the world.

I reported to a young Assistant Product Manager in the HPLC Product Department, consisted of around 20 marketing and laboratory staff. My first project was performing research studies in Fast LC with 3- μm columns, paired with an ultraviolet (UV) detector equipped with small flow cells (volumes of 1-2 μL vs. those of 8-10 μL from those of conventional detectors). This instrument was a precursor to the next generation of HPLC called ultra-high-pressure liquid chromatography (UHPLC), which debuted 20 years later in 2004.

Connecticut was a more expensive state to live in. Within a commuting distance to Wall Street, New York, Fairfield County in Connecticut had many towns with the highest per capita income in the nation, such as Greenwich and New Canaan. We bought a 5-bedroom, 2.5-bath raised-ranch style house in Norwalk, right across the more expensive and trendier town of Westport. The house was two years old and came with an in-ground pool, which required more maintenance and was a burden rather than an attractive addition for the colder northeastern states. One significant advantage for our decision was the mini-bus would go curbside pickup from my house to the Westport train station to New York. My wife's commute was more comfortable because it was only one train ride to the Grand Station vs. three different train, path, and subway rides from our previous house in New Jersey. She later met many friendly bridge players on the train, and they would be reserving a seat at a table waiting for her to board as the fourth player. Life was becoming mundane and full of seemingly trivial decisions and routine chores but had significant daily living impacts.

I worked with many prominent scientists at Perkin-Elmer, such as John Atwood and

Leslie Ettore. I met with legendary scientists such as Marcel Golay (the inventor of capillary GC columns), Abe Savitzky (developer of the Savitzky-Golay noise reduction filter). Our HPLC product consultants were prominent professors such as G. Guichon of Georgetown, C. Lochmüller of Duke, M. Novotny of Indiana, and C. Horváth of Yale. A year later, the company hired R.P.W. Scott from Roche as a research director of the instrumental division, a pioneer in microbore LC and HPLC/MS interfaces.

Looking back, the first three years at Perkin-Elmer were my golden years in chromatographic research. I worked in the laboratory feverishly and wrote 20+ papers on Fast LC applications. The applications group also gave many technical presentations at National Meetings and seminar tours. The job was enjoyable and rewarding. We managed to publish a small booklet on High-Speed Liquid Chromatography in 1981 called the 'red book' vs. the 'green book' published by Harold McNair on gas chromatography. The red book was written mostly by Leslie Ettore, with data generated from my studies. My articles were published in the Journal of Chromatography, Chromatographia, J. of Chromatogr. Sci. and a new trade magazine called the LC Magazine, which debuted in 1983.

With my smooth sailing career, I decided to expand my horizon by taking evening classes in Japanese, painting, real estate, and other hobbies. I obtained a real estate license as a realtor in Connecticut but never actually practiced as one. In 1983, I joined the Norwalk Chapter of Toastmasters International, an association of professionals for improving public speaking skills, where I gave 15 speeches in my first year with the club. I was also active as an officer. My first official title was Sergeant-at-arms with the responsibility to greet each new guests at the beginning of the meeting, much like the official greeter's job at Japanese Department Store who bows to each incoming guest to make him or her feel welcome. I became much more extraverted and learned how to establish rapport with strangers from different backgrounds quickly.

It was an exceptional organization that yielded long-lasting benefits. Besides learning how to do public speaking in a supportive environment, I believe that I learned much

about the 'essence of American culture' by listening to hundreds of fellow members' inner thoughts. Something often missed in the usual social interactions at work or parties. Personal computers were widely available in the early 1980s, and I would type out all my speeches, which inadvertently also improved my writing skills.

In 1984, the honeymoon period at Perkin-Elmer was soon over, as the department lost the initial innovative spirit and directions. At the time, I was looking for a newer career direction within the company. I spent six months in the new Laboratory Robotics Department using an OEM robot from Mitsubishi, which did not succeed as a product because of its limited reach of the articulated arm. In 1986, I volunteered to serve a 1-year assignment as a marketing specialist for chromatography in the Pacific Rim with extensive travels to Australia, Japan, China, and ASEAN countries (Korea, Taiwan, Singapore, Malaysia, Thailand, and Indonesia). This temporary assignment was based in Yokohama, Japan, though I spent more time in China (Beijing, Shanghai, Canton, and Hong Kong.) I flew 40+ trips that year, and my mom was delighted as I visited her six times during transits.

China was relatively backward and an inexpensive place to live in 1986. I stayed at a company-leased apartment at the Friendship Hotel in Beijing and had all my meals in the canteen for a few dollars a day. A 1-hour body massage cost ¥3 RMB, and my personal live-in maid was ¥50 RMB (USD \$5) a month. This assignment was an extraordinary cultural and eye-opening experience though it was difficult for my wife and the young 6-year old daughter.

I returned to the US in 1987 and found the HPLC Department in disarray with declining sales and uncompetitive products. Internal competitions with our subsidiaries in the UK and Germany further diluted the corporate R&D budget for HPLC. The next twelve years at Perkin-Elmer saw my career in a coasting pattern. The Chromatography Division enjoyed some success in the chromatography data system (CDS) with PE Nelson's TurboChrom and limited growth from newer HPLC products such as Series

200. The department changed directors and managers many times without any long-term plans for the product line.

In the 1990s, Perkin-Elmer (PE) struck gold with two product lines. The first was polymerase chain reaction (PCR) for amplifying DNAs, licensed technology from Cetus. The company built and marketed the first PCR thermal cyclers, which enjoyed unprecedented sales. The second was the triple-quadrupole mass spectrometer, a joint-venture with Sciex of Canada. PE-Sciex's LC-MS/MS systems soon became the gold standard in the bioanalytical market for measuring drugs in physiological fluids (plasma and serum). The LC/MS business unit became more critical to the corporation as a profit center and overshadowed the struggling HPLC business unit.

I continued in my application chemist role and worked on protein separations and application-specific systems for food, environmental, and bioscience analysis (e.g., sugars, organic acids, vitamins, PAHs, carbamates, amino acids, PCR, and peptide mapping). I dabbled in diversified roles in product management for micro-LC and marketing/training. I continued to publish over 20+ journal articles and other supporting and marketing literature, including application notes, brochures, manuals, cookbooks for application systems, a DVD for product marketing, and an entire catalog for the PE Brownlee columns accomplished within a month from planning to print. I did contemplate a change of job and had a few interviews with various pharmaceutical companies. Things were not good, though never too bad until 1999.

My First Layoff

My first layoff came when I turned 50, after 19 years at PE. It came as a surprise when the company decided to quit the traditional analytical instrumentation business to concentrate on the emerging biotechnology. It already divested most of the semiconductor, optical, and computer businesses and decided to sell the \$600-million/year Analytical Instrument Division. The new CEO's corporate vision focused on biotechnology's core businesses with two Divisions of Applied Biosystems and Celera

Genomics (Gene Sequencing), which became Wall Street's darling during the Human Genome era. A deal was made to sell the analytical instrument business to EG&G of Boston at a fire-sale price of less than the annual sales figure.

The new owner promptly changed its name to PerkinElmer without the hyphen and did a massive layoff a month after the acquisition. This familiar story repeats time after time in Corporate America, driven by the upper management's short-term profit goals with scant attention paid to product excellence or longevity and the employees' welfare. Looking back, being a minority in corporate American, the latter part of the 20th century could be a contributory factor in our success in career development. With just a strong academic background and work ethic but no network or mentors within the corporate structure, we were often the last for promotions and the first ones for layoffs during any economic downturns.

I recalled everyone was given a booklet by the company called "Who Moved My Cheese" shortly before the layoff to prepare the employees' mental state for the upcoming changes. The year 1999 was not a bad one to get laid off as the job market was strong. My benefits package was one-week severance pay per year of service plus a COBRA program for interim health insurance. I was assigned to an out-placement agency and had a personal coach who taught us how to write a resume and conducting a job search by networking. I had ten interviews and received several offers, after which I selected Purdue Pharma since the pharmaceutical industry was the general direction I desired.

Six Years with Purdue Pharma (Ardsley, New York)

In November of 1999, I started my new job with Purdue Pharma Research Center in Ardsley, New York. The job was referred to me by a former colleague from Naylor Dana, who became my supervisor for the next six years. I started as a Senior Principal Scientist and progressed to a research fellow and a group leader. It was a good change as I learned pharmaceutical analysis, Good Manufacturing Practice (GMP),

management, drug development, method development/validation, and mass spectrometry in those years.

Purdue Pharma was a privately-owned company known for its expertise in sustained-release drug products for pain management. It developed several well-known drugs such as Betadine, Senokot (the number one over-the-counter laxative product), MS-Contin (morphine sulfate), and its flagship product 'OxyContin' (from a synthetic form of an opium-derived chemical called oxycodone). OxyContin was very much responsible for the emerging opioid crisis in America.

I was assigned to support the development of OxyContin's abuse-resistant formulation by combining oxycodone with an antagonist. I was the pioneer in using HPLC with mobile phases at basic pH for the analysis of opioids to replace the older methods using ion-pairing reagents. These superior HPLC methods have better resolution and became standard practice for opioids analysis.

I was involved in method development of new chemical entities (NCEs) and Senokot Laxative. Furthermore, I was getting recognition for my HPLC expertise. I was promoted to a research fellow with the added benefit of a company car (a Saab 9-3 with a 2-l turbo engine with 190 horsepower capable of 30 miles/gal). I became a group leader and had six reports at one time; I learned much about being a supervisor and the many things that a first-line manager should and should not do, often the hard way.

In the Pharmaceutical Analysis Department, I organized most technical training in the Department. I brought in consultants for the departmental training courses in HPLC, method development, and software platforms such as DryLab. This side project in training eventually evolved into a life-long interest in giving my own HPLC short courses at National Meetings starting from 2003. I am not a very ambitious person though my strengths are persistent work ethic, intellectual curiosity, and an affinity for science, learning, and self-improvements.

My First HPLC Book Project as an Editor

In 2003, my first book project came knocking from an experienced book writer when I was invited to be a co-editor for a book on pharmaceutical analysis by HPLC. I would be the junior editor responsible for most of the chapters. In the following 18 months, I worked methodically and tirelessly, inviting authors and writing five chapters myself. I found out that many of the invited contributors were either chronic procrastinators or genuinely lacking in the discipline/ability to write. The 'worst' authors were those with more prominent names. It was with much relief when this hard-cover book with 22 chapters and 658 pages - '*Handbook of Pharmaceutical Analysis by HPLC*' was published in 2005 by Elsevier.

The Second Book Project with John Wiley

In 2005, Heather, a young editor from Wiley, approached me on another HPLC book project. I was not happy with how the previously edited handbook turned out without a consistent style and content and decided to be the sole author of a general HPLC book at an intermediate level. It would be a practical paperback book with an abundance of tables, figures, and chromatograms catering to the laboratory practitioners.

The sole authorship allowed me to maintain better content and editorial controls. This format was feasible since I have accumulated a rich portfolio of chromatograms, figures, and case studies from years of work in HPLC applications, instruments, and columns, short courses, and method development experience in pharmaceutical analysis.

I pushed myself harder this time, working evenings and weekends, through snowstorms, plane trips, allergy seasons, company restructuring, and job changes. I managed to complete all the writing in just nine months while holding a full-time job. Two chapters were written in a hospital room in Hong Kong, where I stayed to keep watch over my father's recovery from surgery. While the book was in production in India, I experienced a second layoff from Purdue Pharma. The reason this time was the

loss of the patent protection of OxyContin. I survived the first wave of a 50% layoff in 2004 but did not survive the 90% second wave in the summer of 2005.

A Stint with a Contract Research Organization (CRO, Wareham, Massachusetts)

The severance benefit was more generous this time around, and everyone received at least 6-months of severance pay. However, the job market was not good this time, the year 2005 saw America in a recession, and most pharmaceutical companies were not hiring. I decided to take an offer from a contract lab in Cape Cod as a research director. The next 18 months were likely one of the most demanding personal and professional periods for several reasons.

The CRO was a leader in avian toxicology evaluation and wanted to venture into pharma analytical services. The company managed to put a core team together with a regulatory/quality director and two research directors (bioanalytical and pharmaceutical analysis), and additional supporting staff reporting to a lab manager. It was a very friendly and conservative organization with the parent company headquartered in Akron, Ohio. The mainline of the privately-owned testing business was in polymer testing and characterization.

The CRO had a new laboratory with four HPLC (Waters Alliance) controlled by Empower, one gas chromatograph, two mass spectrometers, and many stability chambers. The sales team consisted of a single vice president in business development from a larger bioanalytical CRO. The new start-up CRO hoped to focus on the pharma companies around Boston, which was rapidly ascending as the new biotech hotspot.

Working for a CRO was not an easy adjustment for someone coming from a pharma background. Benefits were spartan, and there were no bonuses or stock options. My wife and I decided we would not move, so we commuted every weekend 180 miles each way from our rental apartment in Cape Cod. I bought a new Honda Accord and

managed to put 35K miles in its first year.

We rented a beautiful all-furnished summer beach cottage for \$700/month for the first six months, which was not insulated. The rent would go up to \$2000 per week after Labor Day weekend in the summer. In the cottage, we kept the thermostat low and felt cold most of the time, but the gas bill was > \$400/month. Our next rental in April 2006 was a much warmer 2-bedroom apartment in Fairhaven. It has a western exposure with only electrical heat, though the utility bill was much more reasonable.

I reported directly to the owner of the company in Ohio. He was a former Navy Seal, and we had a teleconferencing call every Monday at 7:30 am on the activities of the past and coming week. One needs to be highly disciplined working for a CRO, and I had to account for every ½ hour of my time billable to various clients' accounts. After a few months, I became quite efficient and had no problem doing a quotation in 30 min and a study report in a few hours.

I continued my HPLC short course training at National meetings such as Pittcon, EAS, and ACS. I brought in a demo UHPLC unit from Waters and used it successfully in method development projects for several clients. This new instrument eventually led to a publication in LCGC on the applications of UHPLC in pharmaceutical analysis in 2007. The business was slow since the first person was not effective in bringing in any new clients. Business picked up when the company hired a new sales director who brought in projects from new customers.

My new book, *'Modern HPLC for Practicing Scientists, Wiley,'* was published in 2006, and it quickly became a bestseller book in HPLC. I was approached to give a six-session HPLC webinar series for AAPS (American Association of Pharmaceutical Scientists) with over 400 attendees in every session. However, I was tired of the long weekend commutes, working for many different clients with tight deadlines, and the upkeep of two residences. I was restless and started exploring a more sustainable

pharma position. In October of 2006, one phone call from a headhunter came in unexpectedly.

The Best is Yet to Come: Nine Years in Sunny California

I have spent most of my career on the east coast of America and around the New York Tristate areas of New York, New Jersey, and Connecticut (CT). Since 1980 I have lived in Norwalk, CT, and it became my second hometown after Hong Kong. I never thought of relocating to California, although I guess that any pivot decisions in one's life were all about timing, circumstances, and mindset.

Genentech is the first and most prominent biotechnology company in the world. Its main campus was located at a 200+ acre bayside property in South San Francisco (SSF) and expanded its product portfolio to small molecule drugs. Genentech pioneered recombinant DNA technology to produce biological therapies and was most successful in targeted therapies for cancer treatments using monoclonal antibodies (mAbs). It had three \$6B+ per year worth of mAb drug products for oncology alone. My position was a Senior Scientist in the newly formed Small Molecule Pharmaceutical Science Department. Genentech was one of the few pharma companies that still believed in doing basic research and drug discovery from the target, candidate nomination, to development.

The company exemplified the 'coolness' and 'arrogance' of the high-tech culture in Silicon Valley. Everyone wore jeans and sneakers so that one could run faster and be comfortable. Free lunches and Fridays' Happy Hours were weekly affairs where beers and wines flow freely without any legal qualms.

In Oct 2006, I went for an on-site interview. The evening before the interview, the hiring manager picked me up in his Land Rover and drove me to an Asian Fusion restaurant in San Francisco to meet with fifteen colleagues from the department. The interview

went well with an hour-long presentation attended by 30 scientists who asked many questions.

The written offer came in late December with a reasonable base salary plus annual performance bonuses, stock options, and sign-on bonuses. It also included a generous relocation package with an interest-free loan, housing subsidies, moving/closing costs, and substantial temporary housing.

A decision to relocate was never easy, though the timing was right this time. My wife took early retirement two years prior, and we sold our house to our married daughter. Both the east and west coast were ideal locations for Asians with excellent grocery support, and I had four brothers and sisters living in the Bay Area. We would make frequent trips back to the east coast to visit our daughter and my wife's family in New York. However, the overriding reason for making this big relocation was to start another segment of my career with a top pharma where scientific research and publications were recognized and required for scientists.

So, at age 57, I moved across the continent to start a new life in sunny California for the next nine years. It turned out to be some of the best years of our lives.

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End of part 2 and to be continued in Part 3 (Late Career at Genentech and MWD Consulting).

My Career as a Separation Scientist: Part 3 (Late Career at Genentech and MWD Consulting).



Part 3: Late Career at Genentech and MWD Consulting, is the last of a series of 3 articles that chronicles my career as an analytical chemist and writer in separation science. The backdrops are my childhood in Hong Kong, education in chemistry, and a chemistry and pharmaceutical research career in America. Part 3 focuses on my stint at Genentech, working on new drug development and relocating back to Connecticut as a pharmaceutical consultant and teacher in separation science.

A Recap of Part 1 and Part 2

Part 1 is a story about my childhood growing up in Hong Kong and how I decided to come to America to study chemistry. Part 2 describes my graduate school journey in New York City, how I became an analytical chemist specializing in separation science and the transition to a pharmaceutical scientist after my first layoff. My technical writing started in 1976 and continued through many industry jobs to the present time.

Relocation to the Bay Area

The San Francisco Bay Area occupies a special place in my heart. It is a symbol of coolness, high technology, and entrepreneurship. It is home to Silicon Valley and the birthplace of biotechnology. Since 1997, the 40 members of our extended family had assembled in the Bay Area for a week of family reunions every ten years (2007 and 2017). Sunny California has superb weather with moderate temperatures without any snow or humid summers. It has the highest residential real estate pricings in the country where million-dollar homes are the norms today.

I arrived at San Francisco International Airport (SFO) on Saturday, March 10, 2007, with a different mindset. Instead of just visiting, I would call this home for almost a decade. I rented a Toyota Camry and drove south on Freeway 101 for 12 miles to Foster City to my temporary housing, a furnished one-bedroom apartment next to a Chinese supermarket chain called Ranch 99.

Buying a Condo

I reported to work the following Monday morning for a day of orientation with 40 new Genentech recruits starting in the same week and went through an elaborate onboarding process. I was thrilled with my personalized access card and the company UNIX ID. I walked into my new office in the late afternoon at Building #14, which had an unobstructed view of the main runway of SFO. There, I spent many hours in the next two years, gazing at numerous departing jets while ruminating strategies on my projects.

The next two weeks saw frenzied activities of unpacking, acquainting with my colleagues and the 200+acre campus, and meeting with realtors in search of permanent housing. I had my mindset on a condo instead of a single-family house since it costs less and requires no maintenance. I spent many weekdays and weekends at open houses and made a bid for a 2-bedroom, 2.5-bath, 2-garage, 1500-sq ft townhouse condo in Foster City. While the inside was not updated, it was located on a private island where we had a water view from the master bedroom. Our first bid was

accepted, and I hired a handyman to install molding, blinds, and shelving in the garage and all closets.

Life in California

Living in California is indeed easier compared to the US East Coast: with informal attires, an open attitude of the diverse population, and of course, the sunny weather. We did not have air conditioning in the condo and rarely needed heating in the winter. There was a large Asian population in the area with an excellent selection of Chinese supermarkets and restaurants. We did not experience any feeling of being a minority in the Bay Area since we were the majority in many locations, particularly those with a strong school district.

It was a carefree and simple lifestyle for the two of us living in a condo with a stable job and a short commute. My days started at 7:30 am in my office till ~6:30 pm to avoid traffic on the freeway. Lunch was taken at cafeterias on campus with multiple subsidized gourmet meals from sushi, customized pasta, soup noodles, or salad bar. After dinner, we took a 30-min stroll along the mile-long boardwalk around the island. Bedtime was around 10 pm with the same routine repeating every weekday. I would go back to Genentech most Sundays, spend two hours at the company gym, followed by some time in the office and a restaurant dinner afterward. We would frequently drive 30 miles to San Jose to our favorite foot massage salon called "Happy Feet," where we would have a coupon book purchased for \$200 good for ten messages plus two extra sessions. These terrific values were tough to match in any other parts of the United States because of the many Asian businesses competing for customers in the Bay Area.

Oddly, I did not feel tired of the 11-hour days since getting paid for working on a cancer cure was quite energizing.

Genentech's Culture of 'Putting Patients First'

Genentech is an unusual company with a strong science-based culture and a deep strength in biology. It behaves like an academic institution that believes in basic research. It employs 100+ post-doctoral fellows who perform fundamental research in diseases' etiology and publishes research papers in journals such as Science, Nature, and Cell.

I am a big fan of the ex-CEO of Genentech, Dr. Art Levinson, a Ph.D. biochemist from Princeton University. He led the company to prominence, commercializing the first monoclonal antibody (mAb) for targeted therapy for HER2+ breast cancer. He proposed that the most important criterion in making a difficult decision during drug development is the impact and benefits to the patient rather than consideration for revenues or business risks. Art left Genentech in 2009 and became the Chairman of Apple and the CEO of Calico of Google. All the Genentech scientists are supposed to devote ~20% of their time to research not related to the company's projects. They would not tell you how you are supposed to find that 20% when most Genentech jobs are all-encompassing and take up all the free time. The company has a 'publish or perish' philosophy for its scientists and vouches to hire the best-qualified scientist whose publication record is a determinant for hiring and promotion.

"Projekt ist König"

I started in the analytical chemistry group in the Pharmaceutical Science Department of the Small Molecule Discovery Division at Genentech Research and Early Development (gRED). Initially, the group consisted of only five members, which later grew into the department of Analytical Chemistry and Quality Control, numbering ~50 staff in a few years. Everyone in the group was expected to work in the laboratory.

In gRED, the motto was "Projekt ist König," a German phrase which meant 'Project is King'. The Pharm Science Department, often known as Chemistry, Manufacturing,

Control (CMC) Department, has the primary function to take new chemical entities (NCEs) into clinical trials. New drug development is an expensive, multidisciplinary, and complex process. It is highly regulated by health authorities such as the United States Food and Drug Administration (US FDA) and the European Medicines Agency (EMA). The process involves the initial characterization of the NCEs' physicochemical properties, scaling up the synthetic chemistry process, investigating their pharmacokinetics and pharmacodynamics, formulating the clinical trial materials, and defining the processing conditions and control strategies of the drug products to ensure their safety and efficacy.

Each drug development project is driven by its own CMC team charged with taking the project to Phase 3 clinical trials. All the scientists in our analytical chemistry group are assigned to one or more CMC project teams, which meet weekly to drive the project forward. Laboratory work is performed by support staff from internal resources or contract manufacturing organizations (CMOs).

During my tenure at Genentech, I was assigned to four CMC projects, an antibody-drug conjugate project (ADC, Kadzyla, or trastuzumab-DM1), and three small-molecule drug projects. My primary project was an inhibitor for prostate and gastric cancer, which I took from preclinical to Phase 2B in five years. This molecule has three chiral centers or eight possible stereoisomers. I developed over 40 analytical methods, including those for starting materials, intermediates, critical raw materials, drug substances, and drug products. Most were HPLC methods, and about one-third of the HPLC methods used chiral separation to measure the amounts of the enantiomers (the mirror-image stereoisomers of the molecule).

Being the analytical lead in a CMC team was an intensive and totally-consuming affair requiring quick responses, endless analytical studies, juggling demands from the rapidly evolving process development needs, and overseeing many outsourced projects to CMOs. It was not unusual to have several teleconferences each day, plus weekly updates to the CMC project team. Multiply these activities by the number of projects,

and you would see a very busy analytical scientist running around all days to the office, laboratory, and meeting rooms.

A Hiring Spree

I was a member of the leadership team and played the role of an acting hiring manager to 10+ positions from scientific managers, scientists to research associates. This was an elaborate process that included writing job descriptions, screening resumes, scheduling and hosting interviews, tallying evaluation results, and pulling together recommendation packages to the corporate hiring committee. Great emphasis was placed on the number and quality of scientific publications, podium presentations, patents, and regulatory filings, in addition to communication and leadership skills. Each candidate was required to give a mandatory 1-hour technical seminar presentation attended by the entire department. Candidates were invited to pre-interview dinners and group lunches to allow close behavior observations in less formal events. This stringent hiring process was a testimony to Genentech's policy of hiring the best available talents with a vigor rarely observed in any other company.

Managing the Departmental Capital Budget

For several years, I was asked by my director to manage the departmental annual sizable capital budget. This process is not as dull as it might sound. It started with an email polling the Department on their planned capital purchases, gathering justifications, scheduling an open discussion at our departmental meeting, and followed by facilitating and then implementing the leadership team's final decisions. I was tasked to upgrade our HPLC laboratories with 10+ UHPLC instruments (mostly Agilent 1290s or 1260s UHPLC), our first high-resolution mass spectrometers (Thermo Fusion Orbitrap and Agilent Time-of-flight (TOF-MS)), a robotics salt/catalyst high-throughput screening system (FreeSlate/Symyx), and the Chromatography Data Client-Server to comply with GMP (Waters Empower 3). Later on, the Department modernized laboratory

informatics infrastructures to implement electronic notebooks (IDBS) and Laboratory Information Management System (LabWare LIMS).

Taking Advantage of the Learning and Training Programs at Genentech

Working in multiple fast-paced CMC teams forced me to master the CMC process's fundamental skills, quality control, regulatory filings, and managing CMOs. On the laboratory side, I learned UHPLC, chiral separations, HPLC/MS, and the rapid development of stability-indicating analytical procedures. In 2013-2014, I proposed two simplified approaches for the rapid development of HPLC methods in early-phase pharm development entitled “A Three-pronged Template Approach” and “A Generic Universal Reversed-Phase Gradient Methodology.” These approaches were published and became my signature contributions to separation sciences (see references below).

M. W. Dong, Separation Science in Drug Development, Part 3: Analytical Development, **LCGC North Am**, **33(10)**, 764-775, 2015

M. W. Dong, A Three-Pronged Template Approach for Rapid HPLC Method Development. **LCGC North Am**. **31(8)**, 612-621, 2013.

Besides, I took full advantage of Genentech’s many professional training programs for personal growth, leadership, and management, plus external courses such as ‘the Looking Glass Experience’ and the “Mini-MBA” program by the American Management Association, and several vendor training courses in mass spectrometry.

I also organized a monthly lunch-and-learn seminar series from equipment vendors and a 15-seminar cross-training program for the entire Small Molecule Discovery Division on the drug development process to promote a better understanding of each subdiscipline of Pharmacokinetics/Drug Metabolism, drug quality, toxicology, clinical development, drug discovery, CMC, and pharmaceuticals (formulations). My department vice-president supported this cross-training initiative by agreeing to sponsor the catered lunches for 60 to 100 attendees in each section.

Several times a year, the company or the Small Molecule Division would invite high-profile plenary speakers onsite. I attended one lecture by Nobel Laureate James Watson, who co-discovered the double-helix structure of DNA, and another by Eric Green, director of the National Human Genome Research Institute (NHGRI). I still recall Green's opening statements vividly: First, he said that “he had a big shoe to fill since the last two directors of the institute were James Watson and Francis Collins (head of National Institute of Health (NIH)).” Second, “all severe human diseases have a strong under-bearing in genetics. Most disease links to genetics are complex, with two notable exceptions (cystic fibrosis and sickle cell anemia which can be traced to the exact mutational alternations leading to the illness).” Another notable seminar was Dr. Leo Lipinski, an ex-medicinal chemist of Pfizer who invented the “Lipinski’s Rule of Five” for drug-like characteristics. Our own Sr. Director of drug discovery happened to be Dr. Bruce Roth from Pfizer, who discovered atorvastatin, which became the mega-blockbuster drug trademarked Lipitor.

Each year, gRED schedules a 3-day retreat at the Asilomar National State Park, where all scientific staff is expected to attend and present a poster or podium presentation. There was a circulating joke saying that “*any employee at gRED could easily be busy attending seminars all day and every day without doing any real work.*” However, during my eight years at Genentech, I have never met any colleague who failed to deliver ostentatiously on their projects.

Extra Learning Opportunities in the Bay Area

The Bay Area is an extraordinary fertile ground for learning opportunities in the biopharmaceutical industry with 500+ pharma and biotech companies spawning in the area, many of which were founded by former employees from Genentech and Cetus. One prominent organization was the California Analytical Chemistry Organization (CACO) that organized many high-quality seminars and workshops in the Bay Area. My first CACO workshop was a one-day symposium on “The Nuts and Bolts of IND

Regulatory Filing” with 500+ attendees at \$125 for the day. Eventually, CACO changed its name to Pharmaceutical and BioScience Society International (PBSS) (<https://www.pbss.org/pbsindex.html>). I benefited a lot from their workshops and gave back to the organization by chairing five workshops on drug discovery/development, drug quality, UHPLC, analytical platform methodologies, and HPLC method development.

Going Back to School

I felt pretty inadequate in biology since I had not taken any biology courses since high school and only one biochemistry class in college. I had no clues on the significance of most of the lectures presented at the Asilomar Conference since biologists dominate the Genentech scientific staff. I decided to go back to school and took a molecular biology course, which quickly led to a ten-course certificate program in Biotechnology from the University California Sant Cruz Extension. During 2010, I went to evening classes twice a week and most weekends. For instance, every Tuesday and Thursday, I would leave work at 3 pm and drove 30 miles to San Jose, where I would eat dinner at my favorite Hong Kong-style café, where I would have a bowl of wonton-noodle and a cup of strong black mild tea for \$8. The school would run from 6 to 9 pm, taught mostly by pharmaceutical professionals. I managed to complete the certificate program in 18 months, consisting of Molecular Biology, Drug Development Process, GMP, Drug Discovery Process, Experimental Techniques in Molecular Biology, Human Physiology, Drug Formulations, Cellular Biology, Molecular Diagnostics, and Toxicology Fundamentals. I was home alone at that time since my wife would go back to the East Coast several months in a stretch to help my daughter with her second child.

Attending Conferences

I continued going to at least two analytical chemistry conferences at Genentech each year - Pittsburgh Conference (Pittcon) and Eastern Analytical Symposium (EAS). This was encouraged by the company as all scientists were expected to do podium presentations at major conferences. In the last 15 years, I became more engaged in

Pittcon and took on an active role in delivering short courses in HPLC and organizing invited symposia in pharmaceutical analysis. We often tacked an extra week of vacation time in Connecticut when Pittcon was held on the East Coast. The timing for EAS in mid-November with a venue in New Jersey was incredibly convenient because we would fly to New York and stay with my daughter's family for two weeks until after the Thanksgiving holidays.

Traveling and Social Life in California

Company business travels were infrequent and consisted mainly of short trips to CMOs during project kickoffs or biannual joint analytical chemistry conferences with our Roche Basel colleagues. During my tenure at Genentech, I only made two big international trips: a one-day meeting in France for the ADC project and a 3-day trip to Roche's site in Ireland in 2014.

There were plenty of social activities by the Division or Department. There was a Happy Hour with hor d'oeuvres every Friday after work, and the Pharm Science annual single-day team building events in San Francisco or touristy hotspots such as Half Moon Bay, Fisherman's Wharf, Santa Cruz, San Francisco Bay, and Napa Valleys. I helped to organize many Ping Pong tournaments with our arch-rivals, the PKDM Department. One year, I came in first place unexpectedly in the intermediate group. The semi-final match was a close call when I was down two games. Somehow, I bounced back and won by three games out of 5. The \$50 gift card for the Target Department Stores was a sweet reward.

My wife and I would travel on our own for weekend excursions. We particularly enjoyed group bus tours during the summer or Christmas Holidays because the tour company took care of all the routing, meals, hotels, and arrangements. Our favorites were the National Park Tours, which often included an overnight stay in Las Vegas en route to the Grand Canyon. We mostly traveled by tours operated by two of our favorite bus tour companies (Lassen or Joy Holidays). These were all-inclusive trips with a

professional tour guide, comfortable 55-passenger motorcoach, 2-star hotels with breakfasts and most dinners. The best trip was a weeklong Yellow Stone National Park tour traveling with my wife's brother, sister-in-law, and sister. We would make at least one trip back to Hong Kong each year and stayed there for two weeks. The exceptions were two shorter trips for my nephew's wedding in 2010, followed a few weeks later by a trip to attend my Mom's funeral. We often tagged on excursion trips to China while we were in Hong Kong.

One unusual perk from Genentech was a six-week paid sabbatical, which all scientific staff was eligible for after six years of service. The company intended to encourage its scientific staff to conduct research elsewhere though most folks would use them as personal vacation days or extended oversea trips. We did just that in April 2013 and spent an 8-day trip boat tour of the Three Gorges upstream on the Yangtze River from Wuhan to Chungking. Our group was a 25-person group of mostly Hong Kong Citizens or oversee Chinese. We embarked on a brand-new river-boat that could accommodate 500 but with only 125 passengers on board, including a large group of East Germans. We made many new friends, and everyone signed-on to a WhatsApp group to maintain contact after the tour.

I often wondered how we managed a busy work schedule, training activities, and extensive traveling schedules during our nine years in California. Nevertheless, we look back on fond memories of those carefree days with a fulfilling career and an active lifestyle.

Ramping up in Technical Writing

In 2013, I received an unexpected invitation from Laura Bush, the managing editor of LCGC North America, to be a columnist to replace the departing Michael Swartz from Waters. I agreed to a column entitled "**Perspective in Modern HPLC.**" I spent hundreds of hours each year, delivering at least four installments for LCGC. HPLC is a mature technology. It is challenging to write an article of general interest with a fresh

perspective to be worth reading by the experienced scientists and novices alike. In 2015, I started a series of four white papers on ‘Separation Science in Drug Discovery and Development.’ This eventually became the preferred format for my columns.

In 2013, I was invited by Professor Davy Guillarme of the University of Geneva to be his co-editor for Trends in Analytical Chemistry (TRAC) on a special issue on “*UHPLC: Ten years after Commercial Introduction.*” The special issue was published in October of 2014, which consisted of 18 papers written by experts in their respective topics. I was responsible for half of the content, including my own contribution as the author to “*Method Development by UHPLC.*”

Relocation Back to Connecticut in 2015

In March of 2015, I reached the typical retirement age, left Genentech, and started planning our big move back to the East Coast. The relocation was quite different this time without the help of a new employer.

Selling the Condo

The first thing was to sell our condo, which turned out to be simpler than expected since the Bay Area real estate was a seller’s market. We contacted a top-performing realtor, an energetic lady (Mary Bee-Thrasher), who came immediately and gave us advice on what we should do before the open house. Three weeks later, our property was listed, and a weekend open house was scheduled. We deliberately underpriced the listing price of the property to make it more attractive. Two days after the open house, a written offer came in at \$50K higher than the listing price. The buyer was one of our agent’s corporate clients, and the final negotiation was completed the same evening since she represented both the seller and buyer.

The Trans-Continental Move

With the condo in contract, we turned our attention to the transcontinental move. The first task was to find a reliable moving company with a good reputation at a reasonable cost. Next was to minimize our accumulated stuff to reduce the cost of trucking to the East Coast.

In America, buying stuff is easier than giving stuff away for free. We made appointments with the local Salvation Army for furniture takeaways twice, and they never showed up. We resorted to hiring a moving crew to deliver unwanted furniture to the local Good Will Stores. For the entire month of June, we went through the Condo room by room for a thorough cleanup and made several trips each day to the Good Will Store or the garbage dumps.

We contracted a moving company (Bekins) that made a detailed inventory of what we needed to move and came back with a quote of \$6K. I believe that was roughly at the cost of \$1/lb. We planned to stay in our daughter's house and buy back the old house from them since we sold them nine years ago. The big furniture would go into a self-storage warehouse during the temporary stay. The last step was to contract an auto-transportation company to move our two cars (Honda Accord and Acura TL) to Connecticut to be picked up a day before our scheduled flight to JFK in New York. We would cover our transportation needs during the last day in California and the first week in Connecticut using one-way car rentals from Avis.

On August 31, 2015, we boarded a United Airlines flight with a few luggage pieces containing all our valuables and my desktop computer. We arrived and stayed in the bedroom downstairs for the next few months. Our two cars, furniture, and eighty boxes of our belongings came a few days later, and most went into a 9'x11' self-storage warehouse. My daughter and her husband spent the next two months looking for another house in the town of Wilton. We repurchased the house at the same price as we had sold it nine years earlier, as Connecticut's real estate pricing had hardly budged in a decade. We were much relieved that things went smoothly in the complicated move, and almost everything went according to plan.

Major House Renovations

On Thanksgiving of 2015, my daughter's family moved out, and we now owned the same house that we had occupied in 1980. My son-in-law was quite a handyman and had done substantial renovations in preceding years, including updating the kitchen and two bathrooms, putting in thermal windows, and installing a new central air system. Nevertheless, there were still remaining projects for us to complete in 2016.

The first was an update of the master bathroom and having the exterior of the house professionally painted. The bathroom update was urgent due to a leak, which was difficult to repair. We were lucky to find a Chinese contractor from New York City who completed the job in a week. He did not cut any corners and rebuilt a new shower stall from sheet rocks and tiles, repositioning all the plumbing in the process. He also lined the entire bathroom and floor with Italian Ceramic tiles and installed a new washbasin, a venting fan, and cabinet. We asked him to update all our bedrooms with recessed ceiling LED lightings, which cost us an extra \$600.

In the past, I had painted (stained) the house with cedar sidings by myself a few times. I also had new gutters with leaf guards, and vinyl trims installed. I would climb up a 32' ladder up and down for weeks in the summer with a brush. I stained all the shingles with a transparent or brown stain. Nevertheless, the house would look almost the same after my 'paint job' as the stain would not cover the mildew-darken shingles. This time, we hired a professional painter to do it properly. The project cost us \$6K with two pros working for the entire week starting from power washing the house to remove all the mildews, sealing the windows, and then spray painting the exterior with two coats of high-quality green color latex paint. They repainted all the white trims, the deck, and the porch. We were pleased with the outcome of our newly painted olive-green colored house, and the paint job should last for another ten years.

Next were the trees and lawn. Our flat half-acre 150'x150' property was lined with hundreds of trees (maples, oaks, ash trees). We had a fenced-in backyard with a 3-tier

split-rail perimeter fence and many planted landscaping white pines in the front and back. Five majestic Hickory trees outlined the front of the house near the main road. The small trees have all grown tall in the last 40 years. I hired a tree service company to take down five trees and trim most of the overhanging branches.

Next, a lawn maintenance company was contracted to apply fertilizer/weed control chemicals four times a year, plus liming and aeration/over-seeding in the fall. While the cost of fertilizer service was about \$70 each time, the cost of aeration was close to \$300. The lawn did look visibly better after a few years of these contracted services. I often wondered how sustainable was the process of adding all these chemicals to the lawn in a typical American suburban yard with all kinds of chemicals for fertilizing, weed control, and pest retreatments from spiders, ants, moths, worms to lime ticks.

Finally, we purchased a new dining table/cabinet set, mattress for ourselves, a bunk bed for the grandkids, and modular shelving for all the closets. With the major projects completed, we finally moved back our belongings from self-storage in February of 2016, a good six months after our arrival.

Being a suburban homeowner in America is indeed a mixed blessing. On one hand, we have a desirable environment with fresh air and plenty of room, privacy, yards, deck, porch, and garages for two vehicles. On the other hand, the homeowners need to be energetic, vigilant, resourceful, and diligent in the constant upkeeps of these amenities and environs since services are expensive to the average middle-income families.

Setting up MWD Consulting

Looking back, leaving Genentech and relocating back to Connecticut to be closer to our daughter and the grandchildren was the right decision at the time. As another full-time job or full retirement was desired, a continuation of my training, writing, and traveling activities appeared to be a preferred option. My CMC and analytical chemistry skills should also be marketable as a consulting service to virtual pharma organizations to

supplement my income.

In October 2015, I became an independent consultant focusing on HPLC training and pharma consulting. I set up a business as a self-proprietor (Doing Business As or DBA) and started building a website. I selected a hosting website service (Wix.com) and built a no-frill website in a few days - <https://www.mwd-consulting.com/>. I paid extra to register my domain name (mwd-consulting.com) and a company email address michael@mwd-consulting.com. The total hosting fee came out to be ~\$300 each year. The business cards cost \$9 for a box of 1000. The most challenging part was the company logo, which I am proud of having designed this myself.

More Training and Conference Opportunities

I have been teaching HPLC short courses at Pittcon and EAS since 2003. Not having a full-time job allowed me to deliver more short courses for American Chemical Society's National Meetings and their circuit series. I made connections with Separations Science of the U.K. and traveled for them to Penang and Singapore in 2016 and 2017.

The premier conference of HPLC International was another series in which I have given courses and tutorials on UHPLC, quality control, and method development (Anaheim 2012, New Orleans 2014, and Beijing 2015). Since then, I have added San Francisco (2016), Jeju Island, Korea (2017), Washington DC (2018), and Milan (2019). These traveling opportunities to exotic locations pleased us and were highlights of the year.

Besides conferences, I received many invitations from local chromatography discussion groups or non-profit education/research organizations such as the Chromatography Forum of Delaware Valley, Massachusetts Separation Science Society (MASSEP), Pharmaceutical and Bioscience Society (PBSS Bay Area), University California Santa Cruz Extension, New York State Biopharmaceutical Society, East Carolina University, City of Hope Center of California, and the U.S. Pharmacopeia. In addition, I provided onsite training to private clients on a contract basis. I traveled about ten times a year

until the international shutdown of Covid-19 brought all my travel plans to a screeching halt.

American Chemical Society (ACS) Career Consultant

In 2016, I became an ACS career consultant, a volunteer position to help members in job searching, and career development. I went to two ACS leadership training conferences in Dallas and Atlanta but was not very active until 2020 during Covid-19 causing widespread layoffs. I was regularly on duty at the weekly virtual office hours and took on many mentees. I usually started with a one-on-one video chat, followed by a resume/LinkedIn profile review and advice on interviewing and negotiation. I know the pharma industry and had plenty of first-hand experience searching for jobs and being a hiring manager.

It is encouraging that the pharmaceutical job market remains robust, particularly for experienced lab scientists skilled in new drug development. I recall a busy week in August, I took on three mentees, reviewed many resumes, and coached two job candidates in interviewing and negotiations on pending offers.

I am happy that I was able to give back to the chemistry community.

More Writing Projects

LCGC Columnist: With the 2015 series of white papers on 'Separation Science in Drug Development,' I continued three more series of white papers on UHPLC (2017), 'HPLC modules with an insiders' view' (2019), and 'stability-indicating method development and validation' (2020). Each of these white papers took 50+ hours and an external review process of at least five reviewers from LinkedIn crowd-sourcing.

HPLC and UHPLC for Practicing Scientist, 2nd Ed., Wiley, 2019. In April of 2016, I signed a contract for the second edition of my HPLC book published in 2006. I took a

more relaxed approach this time and completed the writing in 18 months instead of 9 months. I updated every chapter from the first edition and completely rewrote about half of them. I added three new chapters on UHPLC, LC/MS, and HPLC in biopharmaceutical analysis. Ex-colleagues from Genentech authored the last two new chapters. The second edition has 70% more technical content but maintains the format with an abundance of tables, figures, and case studies. Each chapter was reviewed by external colleagues using an unconventional crowd-sourcing approach by volunteers recruited from my LinkedIn network. The external review process took three months, and India's production took another six months. The new book came out in July of 2019, a 3-year book writing project of writing, revising drafts, reviewing, and proofing.

M. W. Dong, *HPLC and UHPLC for Practicing Scientists, 2nd Ed.*, Wiley, Hoboken, New Jersey, 2019.

Personal Branding and a Communication Platform on LinkedIn

I have been very active on LinkedIn after I started my consulting business. LinkedIn is the leading professional social media platform, with over six hundred million members from 200 countries. It is particularly useful for networking, job searching, and recruiting talents. I use LinkedIn to promote my various publications, training, and conference activities and to increase the name recognition to my consulting business through personal branding. I steadily increased my network from 500 to 9300 in a few years by adding followers mostly in separation science, analytical chemistry, and pharmaceutical companies.

I write over 100 articles a year, focusing mostly on separation science, pharm analysis, and chromatography-related businesses. A small fraction of the articles were topics from my interests in culture, China, language, science, travels, and suburban living. I spend at least 1 or 2 hours each day on the site to respond to questions, making comments, sharing news and articles, and broadcasting job opportunities. I enjoy the immediate feedback and the responses from my diverse network. It was not unusual to receive up to 3000 views in just a few days if an article captures the public's fancy, a

feature difficult to be matched by any magazines or journals. One additional benefit of my LinkedIn networking was the ability to recruit prompt and willing volunteer reviewers for my various writing projects.

'Grammarly' Coming to the Rescue

A big help to my writing skill is a software product called "Grammarly." This software is available as a free download for an introductory version. The premier version comes as an MS Word add-on, which requires a paid annual subscription. My writing suffers from the common grammatical and wording issues of a non-English native speaker on the use of articles, singular/plural, gender, spellings, and tenses, etc. While a conscientious reviewer can pick up most of these issues, it is an extra burden for the reviewers. Although Grammarly tends to over flag issues such as passive voices, I do find it sufficiently helpful to warrant a price of \$140/year.

My New Life as a Semi-retired Consultant

Last week marked the fifth anniversary of my move back to Connecticut. Life was good by not having a full-time job with plenty of opportunities to continue my career interests. I increased my exercising routine with swimming and yoga sessions several times a week.

All these good things came to an abrupt halt on March 14, 2020, with the pandemic shutdown, when all my meetings and travels were either canceled or postponed. I adjusted by spending more time on writing, watching TV series on YouTube, attending webinars, planting a vegetable garden, and taking on more assignments as an ACS career consultant.

It seems like yesterday, as I recalled my first camping trip as a Boy Scout at age 14. Time flies when you are having fun and not suffering from significant discomforts. It seemed surreal as I woke up this morning and found my real self at a stage beyond

retirement. My separation science training has given me a fulfilling career with a stable income to support a pleasant suburban living environment near family members. I am grateful for my good physical and mental health that allows me to continue an active lifestyle and travels to exotic places.

Hopefully, the best time is yet to come.

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The End of the 3-part series on 'My Career as a Separation Scientist' by Michael Dong with the first draft completed on 9/11/2020, six months into the great Covid-19 shutdown, and the 19th anniversary of September 11, 2001 (the World Trade Center Disaster.)