I was a Science-Fair "Ringer"

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In the fall of 1961 I was among the first group of students to attend the newly completed junior-high school (John Muir) on Wausau's far westside. Like other students on the westside of town, I had attended 7th grade at my elementary school (Lincoln) due to overcrowding of the older eastside junior high (Horace Mann). In an attempt to prepare us for what was to come when the new junior high was completed, the 7th graders at Lincoln, unlike the students in grades K-6, actually had their school day divided into periods, different instructors for some of their courses (most notably for English and Social Studies), and different subjects taught in different rooms, though admittedly this involved little more than walking across the hall or one or two doors further down the hallway. In addition, our course titles were upgraded to "adult" status. Thus, instead of "Arithmetic," we now took "Mathematics" and instead of "Language," we now took "English."

Nevertheless, the changes on moving from the old grade school to the new junior high were both striking and profound. The most obvious of these was the sharp contrast in the architectural ambience of the two buildings. Lincoln school had been built in 1892 and was last expanded in 1900 (figure 1). It had 12-foot ceilings, tall narrow windows, old-fashioned cloak rooms instead of metal lockers, slate blackboards with out-

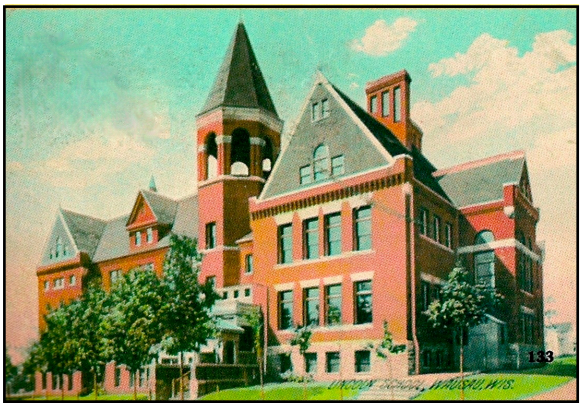

Figure 1. A period postcard of Lincoln Elementary School in Wausau Wisconsin. The central section with the tower was built in 1892, whereas the two wings on either end were added in 1900. The four windows on the second floor of the 1900 section to the right of the tower corresponded to the location of my 7th-grade homeroom.

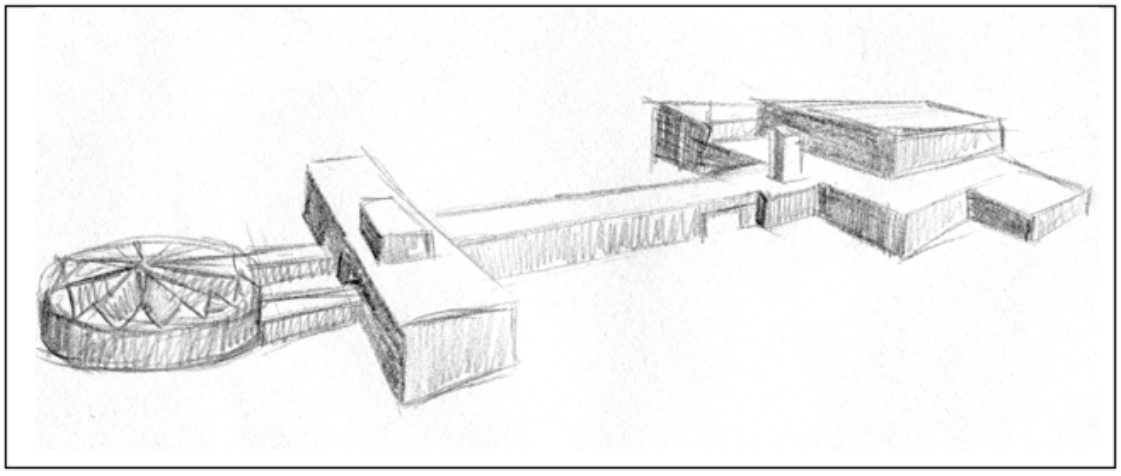

Figure 2. A crude preliminary perspective of John Muir Junior-High School as seen from the north which I probably did for a 8th-grade art project. Section A, containing music and the school auditorium, is the circular structure to the far left. This is followed by the two-story section B, containing administration, the library, humanities and mathematics; then by the long narrow section C, containing science and industrial arts. On the far right are sections D and E, containing the two-story gymnasium, the swimming pool and the cafeteria. The short projection on the north end of section E housed the Wausau School for the Deaf.

Figure 3. A badly stippled and yellowed newspaper photograph from the special *Record Herald* insert showing Mr. Klipstein's 8th grade, general-science class in room C-108. Unfortunately, because of the intense light from the windows, Klipstein is little more than a dark silhouette. Though dressed in a plaid shirt, I am barely visible, fourth head from the left, in the group closest to the windows.

dated speaking tubes and long charts illustrating cursive handwriting running along their tops, and, of course, lots and lots of heavily varnished, creaking wooden floors. John Muir, on the other hand, was the latest in ultramodern 60's chic, with metal moldings and hard terrazo flooring instead of varnished wood, and tile and cinderblock walls instead of plaster and bead-board (figure 2). Whereas Lincoln was tall and compact, with an average of only six classrooms per floor, most of John Muir was spread out on a single floor and seemed, to my inexperienced eye at least, to contain mile upon mile of endless hallways and lockers.

Two days before the new school was officially dedicated on 01 March 1962, the *Wausau Record Herald* published a special, heavily illustrated, eight-page insert with the boisterous headline "John Muir School – A Thing of Beauty!" One of the articles in the insert pointed out that, whereas the seven oldest city schools – most of which dated from the 1890s – had cost a grand total of $225,000, the new junior-high school had cost a whopping 2.6 million dollars!

Now, not just a few, but all of our classes were held in different rooms with different instructors (a total of 35 for the entire school) and the rooms in question were devoted solely to the subject being taught. Thus I was delighted to discover that science was not confined to a storage cabinet in one corner of a single classroom, but occupied a total of five classrooms arranged along the southern side of section C of the building, which connected the two-story section B, housing the administrative offices, humanities and mathematics classrooms, with sections D and E, containing the swimming pool, gymnasium, and cafeteria. I was even more thrilled to discover that each of these science classrooms was equipped with its own demo desk, student work stations, stock room, and prep room.

Enter Mr. Klipstein

Indeed, so large was the new school by the standards of Lincoln Elementary, that for the first week or so I carried a floor plan of the school with me on which my mother had carefully circled and labeled the rooms for each of my classes. Following this roadmap, I found myself each morning in room C-108 attending Mr. Klipstein's third-period, general-science class. A tall, trim man with glasses and reddish-brown hair, Klipstein was probably in his early 40s and sported a short crewcut or flat-top haircut.

Though I would receive an A in his class, for some reason I have no memory of what textbook we used or even if we ever did any experiments. However, I can vaguely recall learning about the classification of clouds and rocks, and some homework survives in the form of drawings of a cross-section of the earth's crust, of the parts of a cricket, of a lilac stem and an onion bulb, and of the electromagnetic spectrum. Just how I cued Klipstein into the fact that I was obsessed with chemistry has also escaped my memory, though I suspect that he caught me reading an outdated chemistry textbook from the public library in class – a ploy that I would later use with some success in my math class as well. In any case, I was soon given the run of the chemicals and equipment in his stock room and allowed to perform chemical experiments on my own after school in the adjacent prep room.

My First Science Fair

John H. Klipstein – to use his full name – was not only my general science teacher, he was also director of the science department at John Muir and was intent on making a name for his new dominion via various academic competitions with other local schools. Thus it was that, sometime in the winter of 1961/1962, he suggested to me and several other students in class that we should prepare science projects for entry into the forthcoming regional science fair sponsored by the Wisconsin Junior Academy of Science and scheduled to be held that May at the local University of Wisconsin Extension Center.

The previous year, while still at Lincoln Elementary, I had discovered an old textbook on qualitative chemical analysis in the public library by Louis Curt-

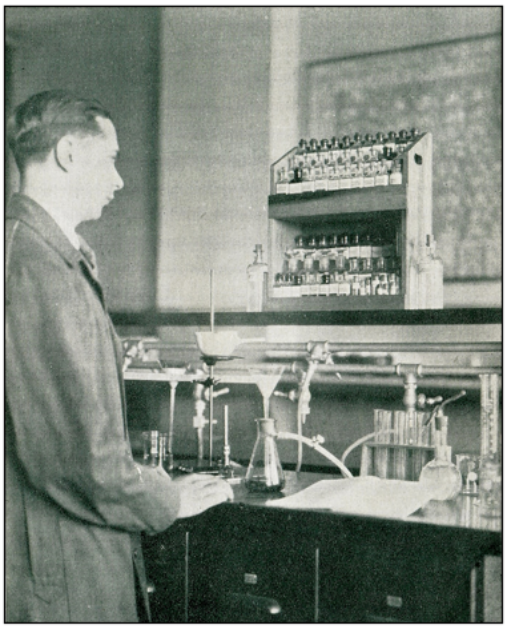

Figure 3. The frontis piece to the 1932 edition of Louis Curtman's *Qualitative Chemical Analysis From the Standpoint of the Laws of Equilibrium and Ionization Theory* showing a standard student laboratory setup for qualitative analysis at City College of New York.

man of the City College of New York (1). I confess that I was probably initially attracted to this book by the frontis piece, which showed a photograph of a student working at a lab bench with all of the requisite reagents and apparatus neatly arrayed in front of him (figure 3). There was something that I found fascinating about the compactness and self-containment of this setup – or perhaps it was some residual nostalgia for what a chemistry set might potentially be rather than the disappointing toy it actually was. In any case, I was strongly attracted to the book and soon discovered that I found its contents interesting as well. I had become bored with the kinds of experiments described in the typical chemistry set manual and in the various home laboratory experimentation books found in the public library. Their so-called "experiments" seemed fragmentary and unconnected with one another – mix A with B and get this color or that precipitate, etc. Indeed the entire enterprise seem to lack purpose and scientific validity. In contrast, the reactions used in qualitative analysis were all logically interconnected and directed toward the scientifically significant goal of determining what elements were or were not present in a substance.

Even though Curtman's book contained a lengthy and detailed treatment of ionic equilibrium, I found I could follow much of the text and soon became desirous of trying to work through the laboratory procedures as well, only to discover that my home laboratory lacked many of the necessary chemicals. Klipstein's proposal seemed like the ideal opportunity to remedy this defect. I would do a science project related to the study of qualitative analysis and leave the problem of coming up with the necessary chemicals to him. As I later summarized the situation in the introduction to the handout that accompanied my final project (albeit with exaggerations as to how long I had been a student of the subject in question):

The idea of finding what a substance is composed of has long fascinated me. When one studies chemistry, he finds it necessary to make tests to prove the results of his experiments or to find out what some unknown material is. To accomplish this we have the sciences of qualitative and quantitative analysis. I became familiar with qualitative analysis a few years ago, but was unable to perform all of the operations because of a lack of equipment and chemicals. This year has been my first chance to renew my unfinished study of qualitative analysis.

I had more recently acquired a used copy of the 1953 edition of the textbook *Introduction to Semimicro Chemical Analysis* by Harvey Sorum of the University

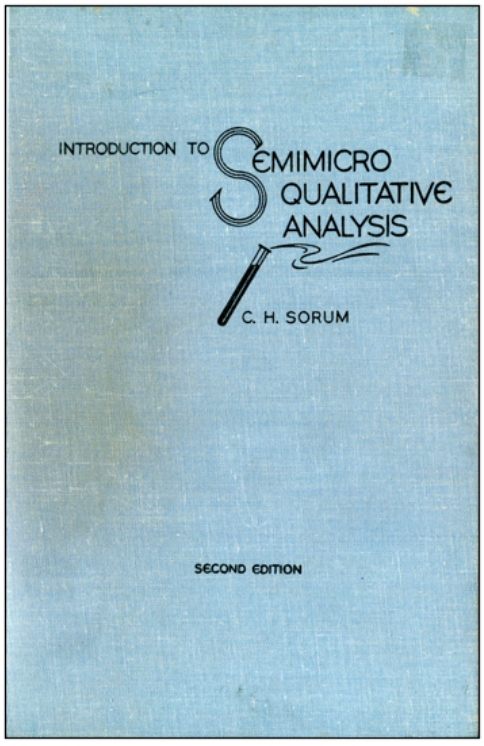

Figure 4. The cover to the 1953 edition of Harvey Sorum's *Introduction to Semimicro Qualitative Analysis* which served as the basis for my 8th grade science fair project.

of Wisconsin (figure 4) (2). Logging in at only 198 pages, this was a far more compact and manageable treatment of the subject than Curtman's 539-page tome, and I decided to use it as the basis for my science project. So I presented Klipstein with both my proposal and the list of required chemicals and equipment given in the appendix of Sorum's manual.

About two weeks later I received a summons to report to Klipstein after school was over for the day. There I discovered, on the laboratory island at the back of the classroom, an array of small vials and bottles containing all of my requested chemicals. I was ecstatic. Never one to pass up a PR opportunity, Klipstein took a photograph (figure 5) to commemorate the occasion which later appeared in the school newsletter with the caption "What is Bill cooking now? Watch out Jensen!" To obtain these materials, Klipstein had contacted Roger Bauer. I'm uncertain just what Bauer's job entailed. His official title was "Science Specialist for the Wausau School System" and I know that he had a small office at Horace Mann. I think he inspected the science programs at various schools and provided special equipment and advice where needed. In any case, by scrounging among the various city schools, the university extension center, and some local industrial laboratories, he had managed to come up with the necessary chemicals. Later, during my high-school years, he would also play an important role in providing me with local industrial contacts.

Figure 5. A posed PR photograph of me with my newly acquired treasure trove of the chemicals required to work through Sorum's lab manual. Since the various reagent solutions would have to made using distilled water, I also set up a distillation apparatus for the photograph

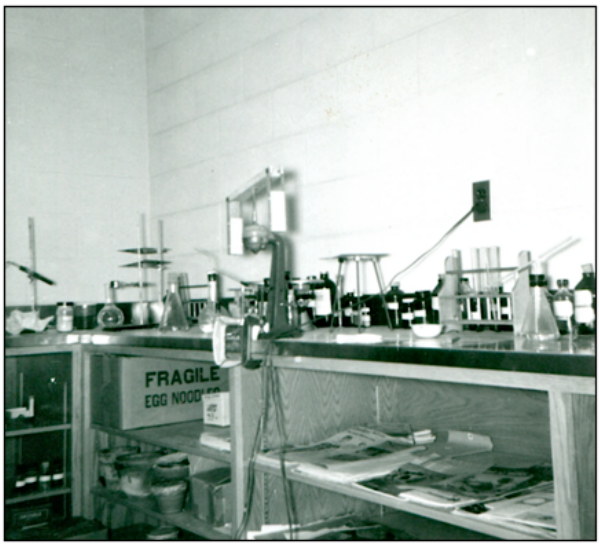

Figure 6. A fuzzy snapshot of the qualitative analysis laboratory which I set up in the prep room to Klipstein's classroom. The object in the center that is fastened to the bench with C-clamps is my home-made centrifuge. The test tube clamped to the ring stand on the far left is my hydrogen sulfide generator.

Initially I thought I would work at the laboratory island at the back of the classroom as this had both running water and gas. However, it was also accessible to other students during the day and soon proved impractical. In the end, Klipstein allowed me to use his prep room instead (figure 6), though for some odd reason this lacked both a gas outlet and a hood. Nevertheless I survived by using a propane torch mounted in a horizontal rack as a heat source instead.

As may be seen from figure 3, the procedures described in Curtman's book, though sized down from earlier 19th-century versions, still made use of filtration and conventional-sized apparatus. In contrast, Sorum's book, as stated in its title, was based on a semi-micro approach. This employed significantly smaller quantities of chemicals, small test tubes, and used a centrifuge rather than vacuum filtration for separations. Bauer was unable to obtain the necessary centrifuge, so my father built one for me at the sign company, following my blueprints, using an old malted-milk mixer. He reversed the motor and mixing rod and added a wooden rotor arm and two wooden tube holders hung using sheet-metal straps. These holders consisted of blocks of wood cut from an old sign with holes drilled for the test tubes. Though it hardly produced the clean separations expected of a commercial instrument, it worked well enough for my purposes. It can be seen in the center of figure 6 and

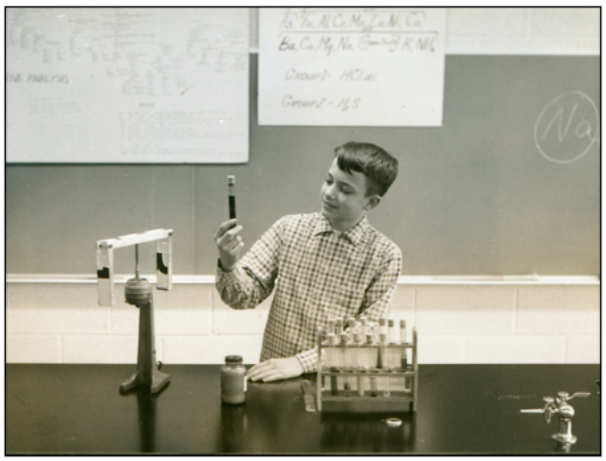

Figure 7. Another PR photograph of me practicing my presentation for the science fair. My home-made centrifuge is to the left and my flowcharts are visible on the back wall. I believe the test tubes contained various colored metal sulfide precipitates.

even better in figure 7. When in use it was fastened to the bench top with C-clamps since it was both top heavy and, when spinning, was constantly threatening to take flight. The strange markings on the tube holders are actually fragments of the lettering on the old sign from which they were cut.

Figure 7 is a second PR photograph taken by Klipstein, this time showing me practicing my presentation for the science fair at the demo desk in room C-108. In addition to my home-made centrifuge, one can see the flowcharts for the qual scheme on the back wall, which I made using a magic marker and poster board, and a test-tube rack containing various colored metal sulfide precipitates. As I recall, I attempted to inject a little history of chemistry into my practice presentation and at one point made a reference to the famous French chemist, Antoine Lavoisier. Having no idea how to pronounce French names, I parsed his last name into three separate English words "Lavo" - "is" - "here." This was immediately followed by my twisting of Henri Le Chatelier's name into Henry Le Chandelier. I thought Klipstein was going to have a bird. He of course immediately corrected my Wisconsin French and I think the most nerve-racking part of the following weeks was having to practice over and over the proper pronunciation of Lavoisier. As is often the case with unfamiliar words, the more I consciously thought about it, the worse the result when it finally came out of my mouth. In my defense, my bizarre parsing of Lavoisier's name meant that, to this day, I have no trouble remembering how to spell it.

The metal sulfide precipitates in figure 7 also raise the question of how I managed to generate the hydrogen sulfide (H_2S) gas required for the precipitation of the group 2 ions in the qual scheme. Not only does this gas smell like rotten eggs, it is also highly toxic and, as already noted, the prep room in which I was working had no hood. An examination of Sorum's manual and figure 6 reveals that I produced the gas by heating a mixture of asbestos, paraffin, and sulfur in a test tube with a cork and attached delivery tube – a concoction that was actually commercially sold for this purpose under the trade name of "Aitch Tu Ess." I assume the odor problem was dealt with by requiring me to work only after school. One of the unforeseen side effects of my semester of dabbling in poisons and obnoxious odors was that the severe adenoid problems that had plagued me throughout childhood disappeared for good.

The science fair was finally held on Saturday 12 May 1962 in the main lecture hall of the University of Wisconsin Extension Center, just a few blocks down Steward Avenue from John Muir. A surviving program indicates that there was a total of 16 participants from six different public and parochial schools. Rather than individual booths, each participant was required to give a 10-minute talk summarizing their project in front of the judges and general audience of parents, teachers, and fellow participants. My presentation, entitled "A Semi-micro Qualitative Analysis of Known and Unknown Substances," was the third one on the schedule and, as a supplement, I also gave each of the judges a seven-page mimeographed summary of the project that I had painfully pecked out on an antique, circa 1916, Remington typewriter that my mother had purchased at a yard sale.

This contained a very brief introduction (quoted earlier), a list of the required chemicals and equipment, a summary of the preliminary experiments, unknown analyses (samples provided by Mr. Klipstein), and alloy analysis (steel wool) that I performed, as well as a conclusion and outline of future hopes:

With the preliminary experiments and the unknown and alloy analyses I have completed the course offered in the book which I used, but as mentioned before, the book contained tests for only a fraction of the elements. In the near future I hope to obtain a sample of ocean water and a book with a complete analytical course (i.e. tests for both common and rare elements), and continue from there.

Also attached were the individual report sheets for the four unknown salt samples and alloy that I had analyzed, modeled on those given in Sorum, and a one-page preface entitled "What is Semimicro Chemical Analysis?" On rereading the latter after more than 50 years, I was struck by the fact that it was an impressive

and insightful performance for a 14-year old, or at least until I took a closer look at Sorum's book and discovered that I had cribbed most of it from his introductory chapter.

The judges awarded two of the projects a first-place or A rating and two a second-place or B rating. To Klipstein's delight, both of the first-place winners were from John Muir – myself and a joint project by Robert Zahn and Jim Joern entitled "Incubation, Fixation, and Preservation of Chick Embryos" (figure 8). One of the second-place awards went to a student at Merrill Junior High for a project on blood typing and the other to a student at a Catholic school in Superior for a project on bacteriology. Though Horace Mann Junior High on the eastside of town had five entries, it had – once again to Klipstein's delight – no winners. As a prize I was given a free subscription to a science magazine of my choice. I chose *Chemistry Magazine*, a publication directed a high-school chemistry students, originally produced by the Science Service of Washington DC and later by the American Chemical Society. All of the John Muir participants, winners or not, were also given certificates of achievement at the school awards ceremony later that spring, thus illustrating that the current egregious practice of declaring every child a winner, irrespective of true performance, has a long precedence.

But not everything was sweetness and light. Part of the judging process involved the use of evaluation ballots distributed to various teachers in the audience, though many were biased toward their own student entries. Interestingly, after the meeting was over, these were given to each of the participants as input for future improvement. Mine reveal that I did not always make the most favorable impression and contain comments such as "don't sway – move around a bit instead,

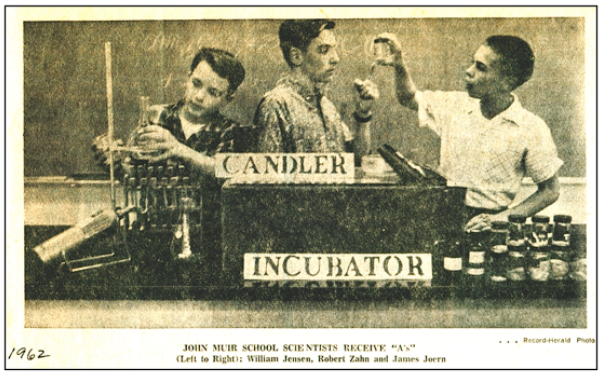

Figure 8. A faded newspaper photo of the first-place winners of the 1962 Wisconsin Junior Academy of Science regional science fair. I am to the left with my test tubes and propane torch and Robert Zahn and Jim Joern are to the right with their pickled chicken embryos.

Figure 9. Robert Gifford, my 9th-grade biology teacher.

don't speak so fast, don't be too sarcastic, sure of himself – posture very casual, try not to monopolize the time," etc. Luckily the three actual judges were more impressed than the teacher evaluators, though perhaps my case was helped by the fact that two of them, Elwin Harris of American Can Co. and Harry Johnson of Wausau Senior-High School, were both chemists.

The Horace Mann participants also did not "go gentle into that good night." After the meeting I was cornered by three of their 9th graders – Tom Larson, Steve Weiner, and Jim Smit – who had coauthored a joint project entitled "Studies in the Behavior of White Mice" and told in no uncertain terms that I had won unfairly since my project did not involve original research and had merely been a rehash of a textbook course. This was an incredibly naive view of student science-fair projects. Hundreds of students and biology textbooks had traced the development of the chick embryo in the past; hundreds of students and scientists had built a van de Graaff generator, like one of the other participants from Horace Mann; or had learned to type blood, like the winner from Merrill and, of course, studies of the behavior of white mice in mazes were legion. The whole point was to encourage students to explore some area of science in greater depth than found in their textbook, not to pioneer some new field of scientific research. I was at least aware of what the scientific literature had to say on my subject, whereas the three participants from Horace Mann seemed to be blissfully unaware of the literature related to their own. I would later get to know both Smit and Weiner in high school, though I would never become close friends with either.

Enter Mr. Gifford

For 9th grade I took biology from Robert Gifford (figure 9) just down the hall in room C-112. Since this

Figure 10. Pen and ink drawings of common weeds done for 9th-grade biology. *Clockwise:* black nightshade, daisy fleabane, bitter nightshade, Jimson weed.

room was also my homeroom, I had known Gifford since 8th grade and was quite comfortable with my new course. Shorter, more heavy-set, and more laid back than Klipstein, Gifford also sported a crewcut or flattop. Indeed, now that I think of it, this was the haircut of choice for most of my male teachers and, along with a sports coat and tie, appears to have been part of some sort of idealized fashion code for male teachers of the time.

Once again I have no memory of the textbook we used, though I recall with great vividness the dissections we were required to perform – an earth worm, a starfish, a fish, and a frog – and the day that Gifford demonstrated to us how to properly kill a live frog for dissection by grabbing it by the hind legs and sharply whacking its head against the edge of the desk. Surviving homework reveals nothing striking – a drawing of a microscope and its parts, a report on my fish dissection, a series of drawings of low-power microscopic views of plant spores and pollen grains, and a series of drawings of common weeds carefully done with a straight pen in india ink (figure 10).

My Second Science Fair

As winter approached, Klipstein became anxious to repeat the previous year's success and began to once again solicit student science projects for the upcoming 1963 Junior Academy of Science regional science fair – not only from his own general science class but also from the classes of the other science teachers, including Gifford's biology class. I did not follow through with the suggestions for future work outlined in my previous project. Unknown to me at the time, a complete scheme of qualitative analysis for all of the known metals had in fact been worked out by Arthur Noyes of the California Institute of Technology back in the 1920s (3), but even if I had been aware of this work, its complexity and the large number of chemicals required would have precluded any significant applications on my part. Rather I chose to pursue a project related to quantitative rather than qualitative analysis – in other words, I chose to learn not only how to determine what elements were present in an unknown sample but also their relative amounts expressed as a percentage by weight.

Unhappily the exact details of what I did for my

Figure 11. A faded newspaper photograph of the winners from Wausau of the 1963 Wisconsin Junior Academy of Science regional science fair, *Left to right:* Pat Chrouser (John Muir), Kathy Konwinski (Horace Mann), Donald Raddatz (John Muir), and myself. The other winners were from Stevens Point, Tomahawk, and Merrill.

repeat performance are mostly missing. In sharp contrast to my first project, there are no surviving handouts, no memory of what textbooks I used, nor of what materials I analyzed. The title of my project – " A Practical Use of Chemical Analysis" – provides no clue as to what I did. However, since I lacked access to desiccators and to both combustion and drying ovens, I think I chose to learn volumetric analysis rather than gravimetric analysis and that I applied it to the analysis of various coins. I say this because I do have a vague memory of teaching myself to do calculations based on molarity, normality and formality and because the local newspaper photograph of that year's winners (figure 11) shows one of my posters in the background labeled "Analysis of Metal B." Nevertheless I am puzzled as to how I was able to do such a project without access to an analytical balance. I'm pretty certain that Klipstein did not own one, and it may be that Bauer once again came to my rescue by providing me with several liters of a standardized solution obtained either from the local university extension or from the chemistry teacher at the local high school. To the best of my knowledge, I continued to work in the small laboratory I had set up in Klipstein's prep room the previous year, since the corresponding room in Gifford's classroom was devoted to biology instead.

As per usual, the science fair was held in the main lecture hall of the University of Wisconsin Extension Center on 18 May 1963 with 24 participants from six different public schools. Again each participant was required to give a 10 minute summary in front of the judges and general audience. This time I was 11th on the schedule and, if I am to judge from the newspaper photograph (figure 11), I sported my new three-piece suit and a series of summary charts painted by my father using his best "showcard" lettering technique, rather than my previous crude effort done with magic marker and poster board.

This time the judges awarded four, rather than two, first-place winners: myself, Pat Chrouser (John Muir) for a project on "Effects of Glue Sniffing on White Mice," Kathy Konwinski (Horace Mann) for a project entitled "My Attempts at Modifying Cold Light," and Susan Buchholtz (Merrill Junior High) for a project on "Chick Embryology." Four second-place awards were also given: one to a student from John Muir, one to a student from Merrill Junior High, one to a student from Tomahawk, and one to a student from Stevens Point. Once more, my win was probably helped by the fact that one of the three judges was a chemist named Robert Kusel, who worked at the Marathon Battery Co., and another was none other than Mr. Bauer himself.

Though not quite the clean sweep it had been the previous year, Klipstein was still pleased with the results since no other school had garnered so many winners. As for my free magazine subscription, this time I chose *Scientific American,* since I had found *Chemistry Magazine* rather disappointing. One new twist was the giving of an official award certificate, complete with a gold seal, signed by the President of the Wisconsin Academy of Sciences, Arts and Letters (figure 12). I must have given this directly to my mother without looking at it, as I was quite surprised on examining it 50 years later to discover that it was signed by none other than Aaron J. Ihde, whom I would later come to know as a prominent historian of chemistry and who would also play a key role in my future career.


The Wisconsin Junior Academy of Science

Certificate of Merit

to

Bill Jensen

In recognition of excellent work in science presented at the Wausau meeting of the Wisconsin Junior Academy of Science during 1963.

Aaron J. Ihde
President, Wisconsin Academy of Sciences, Arts and Letters

Jack A. Arndt
Chairman, Junior Academy Committee

Figure 12. My award certificate for the 1963 Wisconsin Junior Academy of Science regional science fair signed by Aaron Ihde.

Marathon County Youth Conservation Day

The Wisconsin Junior Academy of Science wasn't the only annual competition that Klipstein was intent on winning. Yet another was the annual Marathon County Youth Conservation Day held at the fair grounds in Marathon Park. This consisted of brief sessions on various topics related to conservation and farming along with a series of short competitive exams. Though obviously directed primarily at students from the surrounding farming communities and related in some fashion to the 4H movement, Klipstein nevertheless decided to enter a group of "big city" John Muir science students in the competition (figure 13). Some of these were genuinely interested in the subjects at hand, but others, like myself, were selected solely on the basis of our classroom performance. Klipstein even prepped us for the competition by giving us a series of tutorials after school on such subjects as crop rotation and contour plowing. Since I was neither interested in

Figure 13. Klipstein's 1963 competitive team for the Marathon County Youth Conservation Day. I am in the back row, second from the left. I knew only two of the other team members: Knute Alstad, (back row, far left), who would go on to become a mechanical engineer, and Michael Kluetz, (back row, far right), who, like myself, would go on to become a professor of chemistry.

conservation nor in farming, I was in effect serving as a "ringer" who had been placed in the competition solely to ensure victory against the less academically inclined students from various rural and small-town schools. And, not surprisingly, once again John Muir Junior High walked away with most of the blue ribbons.

Some Observations

Reviewing the surviving documents after the passage of nearly a half century, I cannot resist making a few general observations. Obviously junior high was an exciting time for me. It corresponded to an explosive awakening of my intellectual interests and academic self-confidence. The sudden switch from my rather lackluster academic performance at Lincoln Elementary to my straight-A status at John Muir, coupled with my increasing efforts to self-instruct myself on various advanced subjects using university-level science and math textbooks obtained from the public library, would all seem to suggest that I had become increasingly bored with the grade-school curriculum, though I have no conscious memory of this being the case. Some support for this conclusion also comes from the surviving record of my performance on something called the Metropolitan Achievement Test, which I was required to take at the beginning of the 9th grade. This showed that my basic academic performance (spelling excepted!) was somewhere between the 11th- and 12th-grade level. Yet I would not put too much emphasis on such test results. I was always aware that I had classmates who did far better than I on exams of this sort, including IQ tests, and if, in the end, I seemed to go a little further than they, I think it had far more to do with persistence and monomania than with inherent brilliance.

Of even more importance in my case was the incredible freedom that my teachers gave me to play with so many different chemicals and apparatus that present-day schools would ban. Indeed, at the end of the 9th grade, I was even allowed to take home the stash of chemicals I had accumulated over the previous two years in Klipstein's prep room in order to augment my home laboratory! Later, during my university career, I would volunteer to judge several Cincinnati citywide science fairs and was immediately struck by the total absence of any projects related to chemistry. School administrators are now afraid of even the most mundane chemicals and, largely for legal reasons, simply refuse to allow students (and even teachers) access to them, however closely supervised. Though the number of students injured in chemistry classes is minuscule compared with those seriously injured or even killed each year while participating in school sporting events, politicians and lawyers have, as usual, gone after the easy target. When combined with the current widespread association of the word "chemical" with addictive and dangerous street drugs, with pollution and time-delayed cancers and, most recently, with bombs and terrorism, we now have a public relations nightmare which, not only common sense, but such organizations as the American Chemical Society have proven powerless to combat. The result is a tragedy for both American science education and for the American chemical profession.

Sex and the Science Nerd

But as exciting as this intellectual awakening was, I should perhaps also say a few words about one of the more negative aspects of my impending transformation into a hardcore science nerd, especially since this aspect forms a central theme of the current hit television comedy, "The Big Bang Theory," which is predicated on present-day stereotypes of science nerds. As a comparison of figures 5 and 7 with figures 11 and 13 reveals, junior high not only corresponded to a significant change in my academic performance but to a significant change in my physical appearance as well. In the former, which show my appearance in 8th grade, I still look like a young boy, whereas in the latter, which show my appearance in the 9th grade, I look like a young teenager. Every grade-school and secondary teacher knows that the onset of puberty can easily derail a promising student. Once the hormones start raging and the pressures of dating and social climbing set in, the purely intellectual can be quickly overwhelmed.

In my case, however, the exact opposite occurred. Throughout grade school I always had a favorite "girlfriend" in the childhood sense of the word. In kindergarden and 1st grade it was a pretty blond named Karen Peterson. This ended when my family moved from Marshfield to Wausau and Karen was replaced by an attractive brunette named Vicki Rose Bristol. When Vicki's family moved at the end of second grade, she was, in turn, replaced for most of the rest of grade school by a vivacious, little blond girl named Lynn Gilbertson. All of these childish flirtations, though innocent enough, were apparently mutual, as revealed by surviving valentines and notes, or even by a class photo showing Karen and myself shyly pressing our shoulders together.

With the onset of puberty, however, everything changed. In both junior high and high school I continued to have crushes on various girls, but now there was no reciprocity or even social contact other than the superficial interactions of the day to day classroom. I had suddenly become shy and awkward around girls I found attractive and could only worship them from afar. The situation was not helped by the fact that both of the girls in question were cheer leaders and I was a science nerd. According to the social code of both junior high and high school, this meant that we were, for all practical purposes, "different species."

But, to be honest, even if these girls had expressed an interest in dating me, I would not have known what to do. I had no spending money and no car. I detested dancing and sporting events, and could not even take them home to meet my family, as the behavior of my alcoholic father was too erratic and unpredictable And, to top it off, my understanding of the facts of sex and reproduction was pretty vague until I was well into high school. The boys I hung out with were, like myself, girl shy and did not engage in talk about sex, trying to gain access to pornography, or even gossip about loose girls at school. We were all about science, math and academic competition.

Curiously, I had briefly hung out with a very different kind of boy my first few years at Lincoln Elementary. His name was Bradley Shannon and I swear to God he must have gone into puberty at age 9. He was girl nuts and would spend each recess period trying to look up the skirts of the girls playing on the swings and monkey bars. When, in the fourth grade, all of the girls were taken out of class and marched down the hall to watch a film on "the miracle of menstruation," he became frantic in his attempts to discover what great sex secret had been revealed to them. A few days later I observed the boys during recess whispering something to one another, followed by snickering and laughter. Eventually one of them approached me and whispered in my ear "Tampa!" followed by the usual snicker. I was greatly puzzled and could not fathom what was so funny about the name of a city in Florida. Only many years later did I realize that Bradley had apparently gotten one of the girls to divulge the word "tampon," which the boys, through word of mouth, had somehow managed to distort into the more familiar "tampa," thus illustrating the great truth that virtually anything can be made the object of sexual innuendo.

Though, during my brief grade-school flirtation with Lynn, she had occasionally hinted that she knew a great deal more about the facts of reproduction than I did, I continued to remain unenlightened, if not thoroughly confused, for several more years. At one point I was examined by the family doctor to determine whether my testicles had properly "fallen." From the ensuing conversation between the doctor and my mother, I inferred that this was required in order to successfully make babies. Since I also knew that, as part of this process, the male injected something into the female, I immediately concluded that this something was one of these much valued testicles. While unsure whether I fully thought the matter through, I think I also assumed that once you had expended your initial two shots, a new set of testicles would descend to take their place. Since it was obvious that a testicle was much larger than the opening to the penis, I further inferred that the injection process was quite painful and that this accounted for all of the grunting and groaning that accompanied the sex act.

When I finally broached my new theory with my mother, she was horrified and immediately decided that it was time that someone had "the talk" with me. Since it was obvious that my father wasn't going to voluntarily play this role, she obtained several books on sex education for teenagers from the public library, which she gave me to read. However, while I avidly read the sections on the sexual development of young girls, hoping no doubt to find the key to their growing mystery, I totally ignored – much to my mother's irritation – the sections on boys.

A final source of confusion was the film on sex education that we were shown in 8th-grade health class. This showed a girl and boy standing about five feet apart. As the narrator droned on in vague euphemistic terms, an arrow emerged from the boy's left pant leg and proceeded along the floor and up the girl's leg, where it disappeared under her dress. And that was it! What did it mean? For weeks after I was leery of getting too close to a girl for fear my arrow would begin unravelling down my pant leg.

In the end, I just rationalized away my ineptitude when it came to girls and dating. Starting in the 8th grade, my school advisors had begun mapping out the

courses I would have to take through the end of high school if I wished to become a chemist, and I was further aware that I was also facing at least another eight years of college if I was going to obtain a Ph.D. and be able to afford marriage and children, which, given my strict Mormon upbringing, was the only relationship between a man and a woman that I could conceive of at the time. It seemed pointless to become prematurely enmeshed in relationships that could not possibly survive the end of high school. Of course, all of this meant that in my 20s I would, in true nerd fashion, have to go through all of the initial awkwardness and anguish of dating that most teenagers experience when they are 16.

References and Notes

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