

# ONLINE FEATURE

## LIBERAL ARTS, YEW TREES AND COMBATING CANCER

The following letter from Shimon Schwarzschild, Class of 1950, presents the writer's personal views and are not necessarily those of *NJIT Magazine* or the university. We welcome thoughtful responses to all material published in *NJIT Magazine*. Please send comments to the editor at [Dean.Maskevich@njit.edu](mailto:Dean.Maskevich@njit.edu).

I recently returned to the NJIT campus for the first time since I graduated in 1950 with a BS in electrical engineering, to attend my class reunion. I had been away for 60 years. Instead of an urban “brain factory” of 3,000 engineering students (only three or four females then!), I discovered a spacious university of 8,000-plus students. But more than that, I discovered that many liberal arts courses had been incorporated into the science curricula, an unheard-of mix in my days at NCE. I felt like Rip Van Winkle waking up after a 100-year sleep to a new world. Except my “sleep” away from NJIT was a mere 60 years!

During my 1946-1950 stay at NCE, the only semblance of a listed “arts” course in my electrical engineering curriculum that I remember was the mandatory 1-2 credit “History of Industrial Civilization” course. I therefore created my own arts sustenance and survival program to counter the overwhelming dose of technical courses by enrolling during

each summer break at nearby liberal arts schools in non-engineering courses. I took psychology, line and watercolor painting and clay sculpture, social studies, and even a course on “The Great Heretics” at New York’s “New School,” now part of SUNY. I will never forget the thrill I experienced when one of the great living heretics we studied, world renowned birth control and family planning advocate Dr. Margaret Sanger, walked into class, sat down among us, and participated in our discussion about her work. And when I completed a summer course in abnormal psychology at Rutgers-Newark, I was sure that I was abnormal.

It was therefore a pleasure to receive the spring copy of *NJIT Magazine*. Christina Crovetto’s well-written article, “Bridging the Gulf – Science and the Liberal Arts Converge at NJIT,” convinced me that if I were studying engineering at NJIT today, I could get in touch with my liberal arts side right on campus!

In that issue I was encouraged



by CSLA Dean Fadi Deek’s vision for promoting deeper understanding of the intersection between science and society in the context of bioethics, the environment, and social values. What touched a nerve in me was the work described by NJIT Assistant Professor of Physics Camelia Prodan. She cited an interesting example of such an intersection between science and society: the story of the development and use of the anti-cancer drug found in the yew tree. She describes the dilemma of harvesting yew trees to save cancer patients, thereby

risking the destruction of a tree population or species. This is the popular version of the problem that existed at the beginning of the yew-cancer history.

I happen to know that the reality was and is more complex. I know, because through the fickle finger of fate, I became a major player in a long, ultimately successful struggle to save both yew trees AND cancer patients. Yes, NCE students can stray from their technical training like I did, and land in the most unexpected of “hot seats” if they expand their horizons and use their science

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or engineering disciplines as a stepping-stone. Here is what can happen when an NCE engineering student – me – turned environmental protection expert.

On 22 September 1988, after a career change took me from engineering to conservation and nature protection, I was working as technical publications editor (biosciences) at the USDA Forest Service's Pacific Southwest Research Station. I became concerned about news that the Forest Service, the National Cancer Institute, and pharmaceutical

company Bristol-Myers Squibb (B-MS) were cooperating in cutting down thousands of mature native yew trees in the national forests to extract an anti-cancer drug called Taxol from the bark of the trees.

In just the research phase, before Taxol reached the prescription stage, an estimated one million trees were destroyed in the Pacific Northwest. My friend and then Forest Service colleague, Dr. Stanley Scher, and I were concerned about the destruction to these slow-growing

trees that take hundreds of years to reach maturity. We decided to sound the alarm. I co-authored with Dr. Scher a technical paper that we presented at the California Riparian System Conference at the University of California in Davis titled "Pacific Yew: a Facultative Riparian Conifer with an Uncertain Future." We concluded: "The discovery of Taxol in yew bark poses a threat to yew populations and a challenge for humankind. We should expect such realities in the future as we identify and utilize genetic resources of other plant species. Strategies to both protect and manage the yew resources must be developed quickly if we are to preserve this valuable riparian resource [the Yew]."

The publication of the above warning represented only the beginning of my ten-year-long involvement and, ultimately, battle to save local and global wild yews and cancer patients. I and a group of other concerned individuals realized that it was wasteful to the point of madness to destroy a valuable "chemical factory" like a yew tree by extracting Taxol from the bark, i.e. stripping off the bark, thereby killing the tree, when we could just snip off some of its leaves and branches only, and extract Taxol as well as a valuable pre-cursor: Baccatin III, thus enabling the tree to continue to grow back its leaves and produce its valuable ingredient during its long life span.

Because changing the extraction source from bark to needles

required FDA approval to modify B-MS's new drug permit, and because B-MS wanted to take no action that would slow down its effort to bring this valuable drug to the marketplace ("If it works, don't touch it!"), a small band of concerned citizens and I formed an organization called Native Yew Conservation Council, abbreviated "Yew Conservation" or "YewCon" for short, to force these major players to join in changing the harvesting method from bark to needles, thereby protecting the threatened native (wild) yew populations in the USA and around the world.

As NJIT Professor Prodan surmised in *NJIT Magazine*, "economic factors" were in motion, but they were originally inefficient, ineffective, destructive and too slow. YewCon and other public advocacy and nature protection organizations fought against this destructive form of yew harvesting for many years, using public pressure in the form of public meetings, conferences, and legislative hearings, as well as personal pleas to drug company executives. I organized with colleagues, and administered, two international yew resources conferences in Berkeley, California, and Beijing, China, participating as a keynote speaker. I also gave a seminar on "The Politics of Taxol" at Switzerland's prestigious "ETH" science and technology university, Europe's version of our MIT, attended by the faculty, staff and graduate students.

The resulting adverse publicity

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against continuing destructive wild yew bark harvesting finally forced B-MS to reconsider. B-MS finally stopped the destructive harvesting of wild yews in favor of periodic harvesting of yew leaves, and later the use of planted yew cuttings grown in plantations by the millions, and Taxol cell replication. By then, millions of wild yew trees in the USA, India, Burma and other countries with poor environmental controls were destroyed.

As president, and a very involved member, of YewCon for several years, I witnessed this story play itself out. I became a shirtsleeve expert on yew and Taxol, giving presentations at conferences and public hearings. I became a major witness in a cross-lawsuit between two pharmaceutical giants, testifying non-stop for three days so that one protagonist could “mine” the information I had amassed and use it in the lawsuit. Unconsciously, I had become a depository of unique information so valuable that the company’s law firm was willing to put me on the stand as an “expert witness” and pay me \$400/hour to share it on the witness stand. This was the only time I received payment for my services. Like manna from Heaven, the proceeds allowed me to pay off some of the debts I had amassed as a pro-bono “troublemaker.” What was more valuable for me was the inflation of my ego when the legal parties agreed to classify me as an expert during my court deposition testimony.

I am sharing these personal experiences with the reader because I believe it is also important for scientists, engineers or other “technicians” to be connected to their local and global environment and to help protect it. It is a way of “paying our dues” or “giving back” for the gift of life we have enjoyed. The payback for me in personal satisfaction has been priceless.

NJIT students now have the opportunity to take art, social studies and bioethics courses in the science curricula. My personal experiences convince me that combining such courses and discussions with the primary science curricula on the road to obtaining a science or engineering degree enriches a student *and* her or his potential employer.

A university setting like NJIT is ideal to air and discuss such subjects as environmental justice, personal and corporate responsibility, ethics and bioethics. Such an integrated graduate, who is able to perceive right from wrong and has the integrity to stand up for one’s principles, be they technical, scientific, social or business in nature, is also what our society desperately needs. Somewhere along my life path I came to realize that each of us has the power to make a difference – that we each have the power to leave the Earth a better place than we found it. This realization has taken me a long way, has taken me to who I am today. And I have no regrets!

Finally, I learned an interesting, relevant and almost

humorous footnote in the story of Taxol during my yew-Taxol involvement that would provide an amusing bioethics or corporate responsibility (or irresponsibility) case study in an NJIT social studies course. To start with, I have violated the law throughout these pages by just using the word Taxol. Why? The anti-cancer activity in the yew was discovered during a massive screening program decades ago, sponsored and paid for by the National Cancer Institute (NCI) in which thousands of plants were screened for anti-cancer activity. In 1968, NCI contracted with North Carolina’s Research Triangle Institute to isolate and identify the specific anti-cancer chemical in the yew. The process took over two years. The two scientists (Dr. Monroe Wall and Dr. Mansukh C. Wani) decided to name this chemical “Taxol,” derived from the scientific name of the yew – “Taxus.”

The word Taxol described the specific chemical agent. Taxol was extracted and refined, and also produced by a semi-synthesis process that converts a precursor in the yew leaves, Baccatin III, to Taxol, but that is another story. While Taxol was totally synthesized, it was not produced synthetically in quantity because around 18 complex and expensive steps are required. When B-MS had gone through the FDA’s research and drug trial phases and was approaching marketing, the company wanted a powerful marketing name for its powerful drug. They could

not use the name Taxol because it was presumed to belong to the scientific community, i.e. the federally financed researchers had named it Taxol 20 years earlier and it had become part of the global scientific lexicon.

But B-MS had a clever, Machiavellian idea. The company discovered an obscure, small company in the United Kingdom that had trademarked and been marketing a non-related product also called Taxol. So B-MS bought the trademark and then proceeded to send out legal “cease-and-desist” letters to every user of the term Taxol, warning them of impending lawsuits unless they ceased using that term. So the world was forced to rename Taxol with the innocuous word “Paclitaxel” derived from its Pacific Yew sub-species’ origin, while B-MS became the sole owner and user of Taxol. The Jewish word “chutzpah” would be a fitting term for B-MS’s strategy. Maybe B-MS deserved to get away with such a scheme, just for its audacity and smarts. ■

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