

Monsanto [B]: Ernest Jaworski

Ernest Jaworski¹ paced the room of his office. He had just received a call from Howard Schneiderman to meet with him tomorrow to discuss his proposition. The offer was to move his research from the Agricultural Division turf to Corporate R&D under Schneidermann² himself.

In the early 1970s the Board of Directors of Monsanto decided to create a venture Capitalist firm called *Advent*. The idea behind *Advent* was to ensure Monsanto had a good feel for the cutting edge research in variously related fields. In 1976, Jaworski introduced *Advent* to Genentech, then one of the first few biotechnology firms. Monsanto acquired a small holding in Genentech as its first dabble into the genetics business. Other joint ventures, such as Biogen and Genex, followed.

In 1978, Hanley set out to develop Monsanto's own corporate research in biotechnology. With the help of Lou Fernandez, then executive VP in charge of staff activities, he found and hired a new senior VP for R&D. Howard Schneiderman joined Monsanto in 1979.

Schneiderman was hired from the University of California at Irvine where he was the Dean of the School of Biological Sciences. Schneiderman was well suited for the position because he had both the technical and business background necessary. He had a doctorate in Harvard, was considered a specialist in insect physiology, was a member of the National Academy of Sciences, and, prior to joining the University of California in Irvine, was a distinguished professor of biology at Western Reserve University. He brought with him the educational institutions contacts required to attract top researchers.

In some ways, he added validity to the idea of talented researchers going to work for corporations. During the 1970's and 1980's almost all of the most talented researchers worked for Universities and colleges as either professors or Post-doc researchers. It was, however, not only Schneiderman's talent that was good for business. What was more potent was his ambition not only for himself but also for mankind's triumph over nature. In his autobiography, he wrote "My greatest satisfaction is not in having power over people, but in having power over nature."

As Jaworski contemplated this offer he realized that there were definitely advantages to move his research under Schneidermann. The Agricultural Division, predominantly chemists, was preoccupied with PGRs, another chemical product thought to be the next after Roundup. But Jaworski was thinking in another direction. His bet was biotechnology. He envisioned a plant able to protect itself not through herbicides and pesticides or any external factor, but through its own genetic configuration.

Jaworski's research

Around the end of the 1960's, scientists in the fields of cellular and molecular biology were making critical discoveries (see **Appendix 1** for DNA discovery timeline).

Jaworski, an ardent scholar, excitedly followed these events. It became possible to regenerate a whole plant from a single cell with select characteristics through suspension culture. A 2-month sabbatical at the University of Saskatchewan in 1972, gave him hands-on training on tissue culture technology. To further his exploration, he sponsored and co-chaired with Olf Gamdorg the first Gordon research conferences to facilitate exchange of ideas on advances of plant cell and tissue culture. One of the existing dogmas under question at that time was the notion that foreign genes, when introduced into an organism, would doubtlessly be destroyed. Jaworski knew that breaking down the dogma would usher in unimaginable possibilities. However, aside from these kinds of technical scientific questions and doubts, there were a lot of risk and ethical disputes that plagued the field.

The debate on recombinant DNA, the primary form of genetic engineering, flared up in June 1973 during the Gordon Conference on Nucleic Acids, a private meeting in New Hampshire of some 130 molecular biologists. Discussion at the meeting led its co-chairpersons, Dr. Maxine Singer (NIH) and Dr. Dieter Soll (Yale) to write a letter to the President of the US National Academy of Sciences requesting that the Academy set up a committee to investigate the possible consequence of recombinant DNA techniques. They also wrote a second letter to the journal *Science* to announce publicly the concern felt by molecular biologists that recombinant DNA experiments might entail biohazards.¹

In 1974 a Blue Ribbon committee of the Academy of Science led by Paul Berg published its findings- "Potential Biohazards of rDNA Molecules", later to be known as the Berg Letter. The media and the public were caught up in the fear. Headlines at the time included: "Halt in Genetic Work Urged", (*The Washington Post*, July 18, 1974] "Possible Danger Halts Gene Tests", "Genetic Tests Renounced Over Possible Hazards," (*New York Times*, July 1974).

In February, 1975, the Asilomar Conference was held to draft guidelines to set a scale of special lab safety procedures to match the scale of conjectural hazards imagined to be associated with recombinant DNA experiments. In June 23, 1976, NIH issued further guidelines as an extension of Asilomar. Following the release of the guidelines, several scientists found themselves with completed/ partially completed experiments no longer permissible under the new guidelines. A number were forced to abandon their work.

General public alarm grew. During the summer of 1977, Congress seemed serious in considering the passage of specific legislation covering recombinant DNA research. This prompted the proponents of the original Berg Letter to verbalize their reversal of position from their original review. They believed that the fear and hazards originally contemplated were very speculative and that recent experience with the research refuted them. Members of the scientific community confirmed this stance, lobbyist in support of the cause were engaged, and numerous studies and results concerning safety were published. Finally, in Jan 2, 1979 new revised NIH guidelines

¹ July 26, 1974, *Science* (185:303)

came into force. Guidelines became much more relaxed, and viruses were then allowed to be studied, but genetic engineering was still a touchy subject.

The situation at Monsanto was not so encouraging either. At the Agricultural Division, resources poured into research focused on the immediate commercialization of products where R&D turnover was fast. On the contrary, biotechnology was novel and green. Jaworski's research needed a great deal of basic and fundamental research, before any real commercialization would be able to take place, an activity deemed slow in company divisions. Even at Monsanto, questions and doubts regarding his research were cropping up. Not only was it perceived as a risky endeavor, but also as a competitor to PGRs where much study has already been done.

Outside the company as well as inside, the biotechnology research ahead would be arduous, lengthy and unclear. Schneiderman was offering security of funding and upper management support. Jaworski recognized that a move to Corporate R&D meant that he would have to leave behind everything he had spent a career building. He would be able to follow, fulltime, a line of research that up until this point was something that he could only focus on when work permitted. By moving he would be severing working relationships that he had been fostering for over 20 years. He would also be under the intense spotlight of having to yield promising results. He was no longer just researching for a small part of Monsanto, he was researching for Monsanto's future. The price for failure would be enormous.