Women Scientists and Feminist Methodologies in Louisiana's Chemical Corridor

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The communities along Louisiana's Industrial Corridor, the 85 mile stretch of the Mississippi River between Baton Rouge and New Orleans, have long complained about adverse health effects caused by the chemical industry's pollution. In an effort to persuade government officials that their complaint is valid, scientists, collaborating with community members, have devised ways to document what they believe are the negative health impacts of the chemical industry in this region. This article will look at several women scientists in the corridor who have chosen informal or popular epidemiological methods to demonstrate the impact of industry in neighborhoods that are surrounded by chemical plants. Popular epidemiology is the citizen-initiated collection and communication of health information by concerned residents in a community (Brown 1987).[1] These methods have proven invaluable in the environmental justice movement as they foreground the knowledge and experience of the community residents and their allies. These allies, often scientists, are involved in the public translation of science in such a way that it is meaningful to the communities at risk. This public translation is part of a larger project that sociologists have referred to as the public understanding of science (Irwin and Wynne 1996). Important in this type of understanding is the relationship between scientific expertise and various public groups. Issues about the process by which divergent forms of knowledge are reconciled or privileged are as important as the environmental and health policy decisions that are made. In this way what counts as science begins to reflect broader community concerns rather than the professional biases of rarefied institutional or laboratory contexts.

[1] Phil Brown, a leading scholar of popular epidemiology, is cautious about the term 'epidemiology' as the popular version includes not only data but concern for the social structures and power contexts in which the activity occurs. He "retains the word "epidemiology" in the concept of popular epidemiology because the starting point is the search for rates and causes of diseases (78).

The women scientists in the Industrial Corridor begin their engagement with environmental issues starting their research from the lives of the people that are effected by toxic pollution. They practice what Sandra Harding refers to as standpoint theory: the use of lived experience of community members as a basis "to ask research questions, develop theoretical concepts, design research, collect data, and interpret findings."(Harding 1991, 268) Instead of quantitative or so-called objective studies, standpoint advocates argue for studies generated within the social and political context of the health problem. Harding refers to this form of scientific inquiry as "strong objectivity," a potent combination of local knowledge and universal scientific practice, alleging that it will strengthen objectivity and further the goals of a democratic, citizen-responsive science (Harding 1991, 138-163). Harding's "strong objectivity" argument has two parts that address methodological concerns. The first is that the *context* of scientific inquiry is important because the interests and values of the researchers play a role in the methods and outcomes. The second part of her argument is that science must start from the lives of the marginalized, those less influenced by economic and prestige interests. Harding is careful to point out that the many feminisms that inform her critiques of science cannot be condensed into one idea, but instead represent a wide range of feminist concerns, a topic to broad to address in this paper (Harding 1991). Science scholar Helen Longino best expresses this idea by proposing that "we focus on science as practice rather than content, as process rather than product; hence not on feminist science, but on doing science as a feminist." (1989, 47)

After examining the various methods scientists have used for establishing health claims in the Industrial Corridor, I will propose some additional approaches which further the feminist practice of science, specifically the importance of a community-situated science. All of these approaches move beyond the stale dichotomy of knowledgeable scientists on one side and the ignorant public on the other. The methodologies used by the

women in the Corridor negotiate between various forms of knowledge, privileging both the context and the content of the health concerns of the citizens. Thus the methodologies used by scientists in this region fit within Harding's *strong objectivity* paradigm, a powerful and empowering hybrid of situated knowledge and traditional scientific practices.

Florence Robinson, Participatory Science, and Zip Code Studies

Florence Robinson is a professor of Biology at Southern University in Baton Rouge. An African-American scientist and educator, she was one of the first people in the Industrial Corridor to devise a systematic method of documenting health claims. Her involvement with environmental issues began in 1989 when Rollins, a hazardous waste processor near her house in Alsen, Louisiana, applied for a permit to expand their operations (Schwab 1994, 218).[2] Her neighbors and family had experienced many illnesses such as her son's migraine headaches and her own respiratory problems and began to suspect that the strange odors emitted from Rollins may have been the culprit (Robinson 1997).[3] It was then that she got involved with the Louisiana Environmental Action Network to learn more about the impact of chemicals in her community.

Like many residents of the Industrial Corridor, Robinson prefaces her current concerns for her community with a historic narrative:

> Alsen is a very old community. Before the Civil War, Mount Pleasant plantation sprawled along the river just north of what is now Alsen. Following the Civil War, newly freed slaves from the plantation and other nearby areas settled in Alsen. . . The people of Alsen were very close to the land. They grew vegetables and fruits in their gardens, and hunted and fished in the bountiful swamp. . . Then in 1964 Tim Alexander came to town and Alsen has never been the same. He opened a pit for the dumping of toxic chemicals by near-by

[2] At the this time the Rollins hazardous waste landfill was the fourth largest in the nation and served as a disposal site for major chemical companies such as Exxon and BASF as well a designated site for waste disposal for Superfund sites around the country.

[3] Robinson noted that her son's headache problems ceased when he moved away.

industries (Dow, Ethyl, Exxon, Co Polymer, Uniroyal, Allied Chemical, American Hoechst, Rubican Chemical, Shell Chemical, and U.S.S. Chemical). . . Now the swamp is posted as contaminated with hazardous waste. . .and many residents become sick after eating their garden vegetables.[4]

After the polluted area was labeled a superfund site, the owners proposed to build a hazardous waste incinerator to clean it up. She realized that if the people of Alsen were going to have a voice in environmental permitting in order to stop the expansion of polluting industries, they needed to be educated. She explains:

In my community most of the people that are my age have less than a grade school education because there was no school out here when they were growing up. You're not going to turn people like this into scientists overnight. What they have is something priceless and scientists would do a lot to pay attention to it as they have got incredible common sense (Robinson 1997).

What was more important to her than making the citizens into scientists was teaching them how science operates. If they understand how science works they are better able to "debunk a lot of the nonsense that is out there in the name of science," says Robinson (1997). "What I try to do is just teach them the basic process of science, the scientific method" explaining it in everyday language. This way when the companies make assertions or health claims the community members are better equipped to ask the right questions about the data and the methodologies (Robinson 1997).

One of Robinson's methods for determining the effects of chemicals in her neighborhood was to establish a health registry. Health registries, or the consistent collection of community health data over time, are considered to be one of the most thorough forms of community heath research (Novotny 1998). This method gives the community access to a history of health problems often necessary in initiating government-

[4] Presentation by Florence Robinson from appendix of the Louisiana Department of Environmental Quality, Environmental Justice Hearing (transcript) , Baton Rouge, March 19, 1994.

sponsored research or policy changes . She uses what she calls a citizen survey method of collecting data. She notes that while these informal methods of collecting data are not scientific, they are the first step of the scientific method--- making observations. Next, following the scientific method, "you raise questions about what is causing the problem given all the [hazardous waste] sites in your neighborhood." And lastly, you hypothesize that all of the illnesses may be caused by these sites (Robinson 1997).

But, according to Robinson, traditional science is often insular and unresponsive, much too slow for the people in the communities being hurt on a daily basis by chemical emissions. She uses other more heterodox scientific methods to quickly gain access to information in her community for the purposes of establishing her health registry. One of her many methods is the map survey. The map is one of the primary visual tools used by industry when applying for permits to locate a new facility in the Industrial Corridor. They have been used to present their plans to regulatory officials often in an effort to show the absence of potential problems with their site location. Robinson believed that this same strategy, map making, could be used for community purposes as well. She distributed the map survey materials in her neighborhood and the neighbors marked illnesses, suspicious smells, and dump sites on the maps and turned them back in. She also went door-to-door meeting people in the community and taking down information about heath and environmental problems they had experienced. She says about the informal information-gathering process;" I consider it as legitimate as anything that companies can come up with. . .it may even be more legitimate as industry is biased, the government and the health department is biased [as] it seems to be their role to alleviate the fears of the public."(Robinson 1997)

Robinson uses her maps that mark various illnesses as well as their proximity to superfund sites and industry. These visual tools can be easily updated and used in public

education lectures as well as hearing testimonies before permitting bodies and the state legislature. She has also included her maps and other information gathered during door-to-door canvassing in the community health registry, an ongoing accumulation of information to be used by residents towards improving environmental conditions both currently and in the future.

At the same time Robinson has pursued her interest in environmental racism by showing a relationship between pollution and race, in a series of zip code studies.[5] She shows, via these studies, a positive relationship between race and toxic releases in her parish; the blacker the zip code area the higher the quantity of toxic releases.[6] This work has produced undeniable empirical evidence of the disproportionate impact of hazardous waste on minority communities needed for any official claims of environmental injustice.

Wilma Subra and the Public Translation of Science

Another active participant in the citizen-based environmental movement in Louisiana is Wilma Subra. Subra, with a master's degree in micro-biology and chemistry, went to work in the late 1960's for Gulf South Research Institute in New Iberia, LA. She eventually became head of the environmental science and analytical chemistry sections of the company (Subra 1997). In 1980 the EPA hired the Institute to investigate claims of

[5] According to Robinson, environmental racism is environmental injustice perpetrated along racial lines. Furthermore it is part of the larger problem of what she calls institutionalized racism that has developed historically in the United States and persists to this day. This type of racial inequity is woven into the fabric of everyday life for African Americans (Robinson, DEQ Hearing, 1994) The first study to conclusively link race to pollution was the United Church of Christ Commission for Racial Justice's study "Toxic Wastes and Race in the United States, A National Report on the Racial and Socio-Economic Characteristics of Communities with Hazardous Waste Sites (New York: United Church of Christ, 1987).

[6] This material is taken from a report titled "Environmental Equity" presented to the Joint Committee on Environmental Quality of the House Committee on Natural Resources by Florence Robinson (no date given).

chemical pollution in the upstate New York community of Love Canal. Subra set up a lab on the site and collected samples of the air, water, blood, and urine of the residents. All of the samples were coded so that people would not know their specific results; the study was for statistical data only. She was even told not to talk to the citizens, but to take the samples and leave. "The people were never allowed to know what we found relating to them, "said Subra " and usually they only saw the summary report, but even if they did get the whole report, there was no way they could relate it back to themselves."(Subra 1997) The citizens could not use the information for their own health purposes as they had no idea who was exposed to what nor could they use the information to collect damages from the polluting companies. So while the statistics collected may have had a universal interest for those scientists studying exposure and health, they were of little use to the citizens who were living with actual and potential illnesses.

Subra began to grapple with the ethical questions related to this kind of research done in the name of disinterested science. "There was no one working on the side of the citizens," she explains, "everyone was working on the side of industry or the government."(Subra 1997) This concerned her because the citizens had no right to the information taken from their own bodies. So in 1981 she started her own lab in a trailer located in south Louisiana. Her income is primarily derived from testing sauces, spices, and other food items for which Louisiana food manufacturers are famous. But her passion is the environment and she does pro bono work for many environmental groups in the state. "I do it, " says Subra," because I think folks have a right to know if their water is endangered, if their lives are endangered."(Berry 1988, 32)

One example of Subra's work with local people is in the community of Alsen. Alsen --- Florence Robinson's community --- is host to two superfund sites as well as other actively polluting industries. Concerned about the lack of activity in cleaning up these sites

left by industry, Alsen residents led by Robinson, wanted to convince the EPA to make them a priority. Robinson contacted Subra and asked her to educate the local citizens about the chemical facilities in their area. It was a poor and poorly educated community and Subra "did not want to make things too technical." She brought a handout to the first meeting "so that they could mark on it and take notes." She continues:

We went through the basic issues. This is where the site is. This is the kind of waste that is in it. After the meeting one of the organizers said "you used too many big words." I said that they need to know what a monitoring well is because they can go down the road and see one. They need to know the words the agencies are going to use when they come to town (Subra 1997).

She would go to Alsen every month or so for a meeting with the community group, each time bringing additional information. She would go over the old handout information and then guide them in adding the new information to what they already had. For example, she found out that not only did they drink contaminated water, but many fished in a nearby swamp to put food on the table. "Everything that swam in there was contaminated with several known carcinogens," says Subra, "and no one had offered these people an alternative source of food." The group would mark and update their maps and charts with each of Subra's visits. This systematic learning process continued for a year and a half. Then the EPA came to town to hold a hearing:

"They expected everybody to be screaming and yelling. . .instead they [concerned citizens] got up there and they dealt with the EPA and told them what their concerns were and why they were concerned - and they used all the ' big' words. These people suddenly understood what was going on in their community and were able to communicate with the agency, the media, and their elected officials. . . I was there to help them frame what they wanted."(Subra 1997)

The strategy worked. Not only was the company not permitted to expand its operation, but the EPA also suspended the state's largest hazardous waste disposal company's

authorization to receive and process toxic waste that had previously been shipped in from other superfund sites nationwide. Open hazardous waste pits that served as a dumping area for local chemical companies were closed and cleanup began on some of them (Fontenot 1997). It was a clear victory for the residents of Alsen.

Wilma Subra continues to provide her technical services to community groups for little or no money but insists they participate in the scientific process. When a group calls her with concerns about an existing or proposed industrial facility, she first instructs them on how to get a copy of their permit or permit application. Sitting down at a table with the concerned citizen she translates the permit information into everyday language and puts together a fact sheet for them. Subra explains: " I made this check list of the kinds of things they needed to look around their community for. Where were the water wells? Where are the wetlands? Where are the schools and other vulnerable populations? " (Subra 1997)

Prepared with information and resources, it was up to the community members to decide whether they were going to pursue the matter further. Should they decide to oppose the facility permit, Subra would walk them through the next phase of the citizen-activist process:

> They would start accumulating data and marking it on maps. For the hearing, I'd help them put it all together in a map form so that they could submit it for the record. . . Never before [her involvement] was very much submitted to the [regulatory] agency from the community. All the community would say is "I don't want it" and you can't get a denial based on that (Subra 1997).

Subra would have the citizens "ground truth" industry's claims. "To ground truth," says Subra, "means to go out and verify what is really there. We would present a map to the agency that would show wells where industry said there were none. We would show that their maps were totally wrong. The agency paid attention to these maps."(Subra 1997)

Typically, the citizen-input period for a permit is only 30 days before the formal permit hearing so the people have to be very methodical and organized to gather all the data in that time. It is important that everything be submitted to the official permit record because if something ends up in a law suit, the official record is all that can be considered in court.

But she adds a word of caution about citizen studies using maps and other data gathering tools. She says that a lot of groups' first concerns are about health problems in their neighborhood. They immediately want to do local popular epidemiological studies showing clusters of illnesses and other alleged chemical exposure symptoms. "While geographic location claims are easy to verify -- a water well for instance-- it is harder to verify health claims." (Subra 1997) Specific causation is hard to prove such that companies will take fiscal responsibility for the health problems of a community. The technical nature of much of the chemical industry as well as the specialized expertise of the medical profession often serve as an obstacle to social action, reinforcing feelings of powerlessness in the exposed community (Irwin and Wynne 1996, 59).

Kay Gaudet and the Controversy of Cluster Claims

Kay Gaudet and her husband Chris moved to St. Gabriel, LA in 1974, a year after they had both finished pharmacy school. Kay's parents lived there and the couple liked the out-of-doors and the spaciousness of country living. At the time St. Gabriel had a handful of chemical plants and, when they opened their own drugstore in 1976, the Gaudets even tried to solicit their business. "We were friendly toward them," says Gaudet, " it was not until 1979 or 1980 that the first chemical accident happened that got us involved . . .and nobody in the community was notified of the danger."(Chris and Kay Gaudet 1997) As St.

Gabriel was an unincorporated town the chemical industry continued to grow unchecked causing more concern about the possibility of accidents.[7]

But the final catalyst for their transformation into environmental activists happened when, according to Kay,:

> One day we woke up and saw that there was traffic, bumper-to-bumper, all leaving the area. What had happened was that the facilities had evacuated all their workers out of the area, but they had not bothered to tell the people that live there. . .We became more concerned as both of our neighbors were elderly and had no way to get out (1997).

Other things concerned them about the operations of the plants nearby. Chris explains:

> We used to plant a garden in the back of our house, but we don't anymore as we are 2-300 yards away from Ciba-Geigy, and they manufacture herbicides. They were careless in how they packaged their chemicals and thus white powder would escape the plant site. One morning we got up and we looked at our garden and everything was dead (1997).

Soon other signs of problems began to emerge. "One of the top drugs dispensed at our pharmacy was Nolvadex, which is used for breast cancer" says Kay (1997). She made a statement to the paper regarding her concern and another pharmacist along the Industrial Corridor contacted her; he too was dispensing a lot of the breast cancer drug. She suggested publicly, to no avail, that a study be done. Chris adds that the perception is that there is an elevated incidence of various types of learning disabilities in the local St. Gabriel schools; again this was never deemed worthy of a study by any state agencies (1997). At one time Kay even asked the local toxicologist if they could start sampling the fatty tissue of people that have died in the area, but there was no money for such a study. To date none of these proposed studies has been done.

[7] There are over a dozen chemical companies there today.

Then in the mid 1980's Kay Gaudet received a letter from her sister who had recently suffered a miscarriage. She suspected that the chemical pollution in her area had something to do with her pregnancy loss. This was the first time Kay had begun to think about the relationship between the miscarriages and toxic pollution. She explains that "between what I knew having a pharmacy and knowing everyone in the community . . . we became aware of a lot of women that had suffered miscarriages."(1997) When her efforts made the news, women she did not know began calling her with their stories of pregnancy loss in the St. Gabriel community.

At this point, Kay was very concerned about what she perceived as an excessive miscarriage rate in St. Gabriel. She said:

> I was keeping a journal and it got kind of scary. One July 4th weekend, we had a long weekend. There had been three women in four days that had miscarried. It occurred to us that when you had one, you had numerous ones, like it was cyclical--we had a feeling that is was related to chemical releases that may have occurred (1997).

Kay's informal inquiry led her to believe that in St. Gabriel, a town of 2,100 inhabitants, "approximately one-third of the pregnancies since 1983 had ended in fetal death."(Schwab 1994) This amounted to more than 60 miscarriages by 50 women in three years.[8]

Again, the Gaudet's contacted state agencies asking them to look into what appeared to be an alarming trend. They did not respond. Kay eventually contacted the Sierra Club for help. They agreed to send Gaudet to Washington, D.C. to testify before a congressional hearing on pollution; soon after state officials contacted her. The Louisiana Department of Health and Hospitals paid Tulane University's School of Public Health and Tropical

[8] From "St. Gabriel Awaits Study on Miscarriages," Times-Picayune, 10 September, 1989, sec. B, p.9.

Medicine $100,000 to do the study which was completed in 1989.[9] The investigation, which included not only St. Gabriel, but the entire eastern portion of Iberville Parish, found that the overall miscarriage rates for the eastern half of the parish were between 12.7% (documented) and 15.7% (documented and undocumented), well within the national norm of 15%.[10]

The Tulane report further concluded that there was "no significant association between proximity to industrial site and incidence of miscarriage."[11] It is unclear how the researchers could make this last claim. They chose not to study only the town of St. Gabriel, which is surrounded by industry, but instead chose a much larger region encompassing the town because the larger population would yield statistically better data. The larger population of east Iberville Parish, however, was not necessarily exposed to higher levels of industrial pollution, so elevated pregnancy loss would not be expected. The State attorney general, William Guste, Jr., was not convinced by the study and hired an independent consultant to review the Tulane study. In reviewing the data, the consultant, Richard Clapp, an epidemiologist from Boston University, found that women living within a half mile of a chemical plant appeared to have a significantly higher rate of miscarriage. Both Guste and Clapp agreed that the study conducted by Tulane was inconclusive at best.[12]

Paul Templet, an LSU environmental studies professor agrees. He says, "you can design studies that don't show much."(Templet 1997)[13] He believes the St. Gabriel miscarriage study done by Tulane is a perfect example of this. He says:

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[9] From the "Final Report: St. Gabriel Miscarriage Investigation," (New Orleans: Tulane University, School of Public Health and Tropical Medicine,September 27, 1989).

[10] Final Report, i.

[11] Final Report, vi.

[12] Richard Clapp's opinions were stated in the local newspaper by James O'Byrne, "Study of St. Gabriel Miscarriages Flawed," Time-Picayune, 16 May, 1990, sec. B, p.10. Paul Templet (1997) asserted that the study was flawed as well.

[13] Templet was secretary of the DEQ for four years. As an environmental scientist he was a staunch advocate for citizen participation and stringent environmental enforcement. His administration was involved in reviewing the

"They did find elevated miscarriage rates among white females. They had trouble interviewing black females -- it was a cultural thing. They don't talk about miscarriages as they consider it to be a failure. There was an elevated rate but because of the way scientists do statistics, the result didn't reach the 95% confidence level, a standard used by epidemiologists. . . So while they did see an increase in miscarriages among white females, they reported it as "not significant." But the term "not significant" is a statistical term [and] industry picked up the term and started using the word "insignificant" which is not what it means." [14]

Since Templet was Secretary of the state department of Environmental Quality during the time the study was completed he was able to ask the researchers "why they did not do a regression analysis using some surrogates, like distance from the plants to these clusters to see if there is a connection between distance from industry and the miscarriages."(Templet 1997) They told him that his suggestions were not part of the original design for the study and that no one offered to pay for additional studies. They did admit in the final report that their case ascertainment for black women was low. The stillbirth rate (which was considered a miscarriage for purposes of this study) for black women in east Iberville parish was almost double that for black women in the state, but this was found to be not statistically significant.[15] He was disappointed in the study because he felt that by not looking at the correlations or clusters it is difficult to ascertain the cause of any abnormality. He felt the study, by encompassing a large enough region to produce proper epidemiological results, missed the miscarriage problems of St. Gabriel. The study's design insured the findings would be negative.

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report that Tulane submitted. He admitted to me in the interview his disappointment in the study which the state funded.

[14] In my interview with the Gaudet's, Kay mentioned that some of the black women were reluctant to talk about their miscarriages because family members worked for one of the plants. From my own observation, there is a general mistrust of government-sponsored surveys and programs in this area that tends to be more pronounced in the minority populations, probably due to past experiences.

[15] Final Report, v.

One of the major hurdles the citizens of the Industrial Corridor are facing is that which science studies scholar David Hess terms “undone science.” He says: “Citizens who seek information about environmental, health, and other technoscientific problems often find that the crucial research has never been done or that it amounts to a small trickle. At the same time, there is a torrent of research into problem areas that industrial interests deem worthy and important.”(Hess 1999)

Community residents have had numerous concerns regarding respiratory illnesses, for example, that have not been studied. Further, why have small, localized studies of miscarriages been left undone while expensive studies that examine parish and region-wide samples of populations with no similar exposure history been funded exclusively? I suspect that there are corporate and governmental stakeholders in the pollution and causation arena that benefit from this absent knowledge.

Given this aporia in relevant citizen-centered studies, what other types of scientific approach might help communities understand the relationship between pollution and health? It seems a divide currently exists. On one side is orthodox epidemiology that uses complex mathematical modeling tools but provides little insight into the community’s health problems. On the other side are popular studies showing illness clusters but appearing anecdotal and having little rigorous control over the content of the study. A hybrid approach combining both the distant objectivity of universal science and the judgmental relativism of local knowledge is needed. Recognizing that science has political and thus power-laden dimensions, feminist scholars such as Sandra Harding have advocated for a socially situated approach to generating scientific knowledge. She claims that “sciences created through political struggles, which are the only ones we [feminists] have ever had, usually do produce reliable information about nature and social relations--- reliable, that is,

for some group or another's purposes."(Harding 1991, 10) In the Industrial Corridor, the citizens have had little help from official agencies in generating useful health studies from their point of view. All of the state and corporate sponsored research has verified the corporate claim that chemical plants are not unhealthy. Research studies designed with the community's concerns and observations in mind would be a step towards generating a socially situated scientific knowledge regarding the effects of exposure to chemical pollution.

But Hess cautions against the over-reliance on standpoint approaches as they can sometimes "underplay the justification process that is necessary for new theories, methods, and knowledge claims to become generally accepted in the research field."(Hess 1999) Justification is the set of processes and procedures by which orthodox science deems one theory better than another. Relying on the voices of community members alone for scientific information denies the potential contribution of institutional science. Orthodox science has been highly effective in addressing human health concerns and adds an important dimension to situated science studies that should not be ignored. Harding's strong objectivity program combines aspects from both locally-generated approaches to science as well as traditional scientific methodologies. At the center of her program are feminist standpoint epistemologies that:

"call for the acknowledgment that all human beliefs---including our best scientific beliefs--are socially situated, but they also require a critical evaluation to determine which social situations tend to generate the most objective knowledge claims. They require, as judgmental relativism does not, a scientific account of the relationships between historically located belief and maximally objective belief."(Harding 1991, 142)

Understanding the relationship between local knowledge and universal science when developing a research plan is an important step in the practice of doing feminist science towards improving the lives of the citizens in this toxic region.

Two such complementary approaches to understanding the relationship of illness to the environment have been proposed. One takes the individual and his or her own exposure as the center of study and the other places the community as the focus of study. Together they form a promising, holistic approach to understanding the effects of toxic pollution on the citizens of the industrial corridor.

The first approach is that of Patricia Williams, director of the LSU Medical School Toxicology Outreach Program. She prefers to look at small groups of people, and studies the cellular aspects of toxic exposure. She runs a medical surveillance lab that focuses on the early detection of diseases. According to Williams this new field of medical research will provide a lens into the origins and first stages of diseases. Her lab is currently studying the Grand Bois community, a community adjacent to a large oil-field waste site, and afflicted with numerous diseases and cancers.[16] This well publicized dispute between a small Cajun and Native American community in south Louisiana and Exxon has centered on whether or not this waste is causing the citizens' illnesses. She has collected blood, urine and other clinical specimens and examined them for parameters that would indicate toxic exposure (Williams 1998). She looks for many different illnesses and abnormalities, not just cancer. Her work takes into account the lifestyles and medical background of the people. In this way she begins to get a picture of everything that is involved in the origin and evolution of a disease. "This approach," says Williams," is far superior to any numbers game" of the epidemiologist (1998).

She believes that the mathematical models epidemiologists use are too broad to show causation and should only be used as a screening tool to give you a possible direction for

[16] Ed Bradley has done both television interviews (Charlie Rose Show, December 22, 1997) and a television special on the subject of oil industry pollution in Grand Bois (CBS On Assignment: Town Under Siege, December 23, 1997).

further research. Epidemiology, according to Williams, should be used in addition to and not in place of other more localized studies.

Williams respects community-generated health studies and has heard about Kay Gaudet's miscarriage study. She noticed that Gaudet made some excellent observations that should have initiated a detailed study of reproductive problems in the St. Gabriel area. Miscarriage, however, is the least sensitive indicator of reproductive problems as about 15% of all pregnancies end this way normally. Instead, Williams recommends looking at indicators such as: the number of birth defects, the number of children born that live less than 30 days to a year, the number of premature births, and the number of ectopic and molar pregnancies. She has used this methodology and found "tremendous differences between the control population and the exposed population."(1998)

Studying the effects of pollutants on the fetal phase of human development makes sense to Williams since "embryonal cells, by their very nature, are highly proliferative (undergo extensive cellular division) and chemically mediated (respond to chemical stimuli.)" She also notes that residual embryonal cells remain in the body until puberty and "if triggered into cellular division after birth, can form tumors," such as rhabdomyosarcoma and neuroblastoma.[17] For this reason studying childhood cancers may be another conclusive way to understand the effects of toxic exposure in humans.

It is important to note that while childhood cancer is relatively rare, its rate of increase has been about one percent per year, making it the most common fatal childhood disease, according to the National Cancer Institute.[18] The rarity of cancer among this age group makes it difficult to discern both trends and causes using inferential statistical

[17] Williams, personal correspondence, nd.

[18] John H. Cushman, "Rising Children's Cancer Rates Reshapes U.S. Research Efforts," Times-Picayune, Sept. 29, 1997, sec. A, p.1. Statistics suggest that a newborn child has a 1 in 600 chance of contracting cancer by the age of 10.

methods. Health specialists advising the EPA believe that toxins in the air, water, and food of children are one of the prime suspects in this alarming trend.[19] Dr. Philip Landrigan, the EPA's children's health advisor and pediatrician who directs the division of environmental medicine at Mt. Sinai School of Medicine in New York says: "The increases (in childhood cancer) are too rapid to reflect genetic changes, and better diagnostic detection is not a likely explanation. The strong probability exists that environmental factors are playing a role."[20]

One specific form of cancer, rhabdomyosarcoma, a highly malignant, soft tissue tumor is diagnosed in about 200 children in the United States each year which is, statistically speaking, one in every 250,000 children. In the early 1990's three children in the predominantly rural and heavily industrialized Ascension Parish were diagnosed with the disease within a fourteen month period. The children lived within a six mile radius of one another.[21] While this was alarming, it was not the first instance of a childhood cancer cluster in the chemical corridor. Several years earlier, in another heavily industrialized parish (East Baton Rouge), there had been a cluster of four more children diagnosed with rhabdomyosarcoma. The children lived in the town of Zachary, a few miles from Alsen and the various industry and superfund sites that populate Florence Robinson's neighborhood. The oncologist treating the four children requested a study be initiated on what appeared to be a concentration of such a rare illness in a very short period of time. The four children died and no study was ever done.[22]

There are other indicators that the diagnosis of childhood cancer and other catastrophic childhood illnesses may be growing along the industrial corridor. One of the

[19] Cushman, A-8.
[20] Cushman, A-8.
[21] Laurie Smith Anderson, "Doctor Says Cluster of Cancer Cases Merits Investigation," Baton Rouge Advocate, March 31, 1996, sec. H, p. 2.
[22] Anderson, H-8.

major treatment centers for this disease and other catastrophic childhood diseases is the St. Jude Children's Research Hospital in Memphis, TN. Patients at this hospital come from nearly every state in the nation as well as from over fifty foreign countries. Since the research hospital opened in 1962, Louisiana children with cancer accounted for nearly 13% of all the patients treated at the facility. In 1996, of the 567 children from Louisiana on "active status", 40% come from a four parish area within the industrial corridor.[23]

Patricia Williams believes that the numbers of these rare childhood cancers warrant an investigation before dismissing them. She explains that, "given the rare incidence of these tumors and their proliferative nature upon chemical stimulation, they may serve as environmental indicators when occurring in clusters in communities that are adversely impacted by toxic exposures."[24] Although Williams' micro-approach of beginning with the body and working inward to a cellular level holds promise at this point, many communities and community-oriented scientists and physicians in the chemical corridor have little idea what the variety of pollutants are by which the body is being affected.

This is where the second approach to understanding the effect of toxins on communities can be helpful. Determining the effects of pollution on nearby communities takes looking at the proximity of the community to industrial pollution and mapping that information onto the health data from the community. Charles Flanagan, a geography graduate student at LSU proposes a more location-specific approach to toxic emission documentation particularly in areas that have been involved in environmental justice struggles in the state. He proposes that, for purposes of pollution studies, instead of making the chemical plant the center of the map and drawing 1, 2, and 3 mile rings radiating

[23] Anderson, H-8.
[24] Williams, personal correspondence, nd.

out from the facility as in permit application maps submitted by industry, the community to be studied be placed at the center of the map. Says Flanagan:

> I think we need to take the community as the focus of analysis. In this way, we can begin to develop a picture of the potential cumulative impact of any new facility. . .We need to construct the size of the study area around the community in a manner that relates to toxic air dispersions [having to do with wind speed and direction] where there have been actual accidents.[25]

In this way Toxic Release Inventory data and other important information on toxic material can be presented in a way that is meaningful to the community at risk. This type of pollution study is exposure-driven and allows community-oriented health studies to be focused on those populations that have been placed at risk rather than relying on statistically-driven, multi-parish health data (Ozonoff and Boden 1987, 74). In this way exposed and control populations can reflect actual events and lived experiences important in collecting health data that is community-oriented.

By developing a geographic model that places the community and its citizens at the center, Flanagan's methodology creatively intersects traditional disciplinary science and the situated politics of the industrial communities. In the same way that Williams' desires to see diseases close up and learn from this complex interplay of variables, Flanagan desires to analyze the local community's exposure more thoroughly. By placing the specific resident or community at the center of an investigation, science is constructed around what is happening to the people, rather than people being constructed to fit mathematical scientific models.

Conclusion

[25] Shintech Hearing, Department of Environmental Quality, Convent, La., Jan 24, 1998: 343-345.

Florence Robinson, Wilma Subra, Kay Gaudet, Patricia Williams and Charles Flanagan are feminist science workers. They all approach scientific knowledge-making beginning with the problems identified from within the exposed communities. While they continue to use their own expert skills to design research studies, they are careful to situate their work, including the observations and concerns of the residents. In this way their approach parallels Harding's feminism-inspired of "strong objectivity," a hybrid approach combing both local and universal knowledge toward community problem solving. Harding, however, is not advocating a single feminist method that she believes would be just one more " simple recipe we could follow and prescribe in order to produce powerful research and research agendas. . ."(Harding 1989, 30). Instead she supports a more complex formulation of feminist research consisting, first, of a critical understanding of the ways in which science has been embedded with dominant power schemes in their relentless creation of outsiders and, second, a reflexive relationship with other liberatory movements aimed at giving voice to marginalized others (Harding 1991).

Following Harding and Longino what feminism can bring to the discipline of environmental science are new processes and practices of science that are relevant to the communities at risk. In these feminist visions of science, the context of its practice as well as the questions that it asks are condsidered open to political positioning rather than closed in some idealized objective process. This opening allows for the possibility of movement in scientific investigations, examining the procedures and outcomes for evidence of corporate interests and governmental biases in environmental disputes. According to Sandra Harding, there is a "gap between the understanding of the world available if one starts from the lives of people . . . and the understanding provided by dominant conceptual schemes."(Harding 1991, 276) Connecting the two in ways that recognize power inequities, thus granting more authority to the voice of the community, is important in any feminist conceptualization of environmental science.

The relationship between knowledge and citizenship must be at the center of any attempt to renegotiate power and influence in the Industrial Corridor. The environmental movement with its heterogeneous mix of participants is ideally situated to both legitimate and practice science from the public's perspective. I believe that by pursuing this type of citizen-situated science with methodologies that begin with people's experiences more satisfactory answers to the community's questions about toxic exposure can be found.

References

Berry, Jason. 1988. The War on Toxic Waste. *Louisiana Life* 8, no.4: 28-35.

Brown, Phil. 1987. Popular Epidemiology: Community Response to Toxic Waste-Induced Disease in Woburn, Massachusetts. *Science, Technology, and Human Values* 12, no. 3&4:78-85.

Fontenot, William. 1997. Interview by author. Tape recording. Baton Rouge, LA, 12 June.

Gaudet, Kay and Chris. 1997. Interview by author. Tape recording, St. Gabriel, La., 6 June.

Harding, Sandra. 1989. Is There a Feminist Method? In *Feminism and Science*. ed. Nancy Tuana. Bloomington, IN: University of Indiana Press.

Harding, Sandra. 1991.*Whose Science? Whose Knowledge?* Ithaca, NY: Cornell University Press.

Hess, David. 1999. The Problem of Undone Science: Values, Interests, and the Selection of Research Programs. Paper read at the Annual Meeting of the Society for the Social Study of Science, 30 October-2 November, Halifax, Nova Scotia.

Irwin, Alan and Brian Wynne, ed. 1996. *Misunderstanding Science?: The Public Reconstruction of Science and Technology*. Cambridge: Cambridge University Press.

Longino, Helen. 1989. Can There be a Feminist Science? In Nancy Tuana, ed. *Feminism and Science*. Bloomington, IN: University of Indiana Press.

Novotny, Patrick. 1998. Popular Epidemiology and the Struggle for Community Health in the Environmental Justice Movement. In Daniel Faber, ed., *The Struggle for Ecological Democracy*. New York: Guilford Press.

Ozonoff, David and Leslie I. Boden. 1987. Truth and Consequences: Health Agency Responses to Environmental Health Problems. *Science, Technology, and Human Values* 12, No. 3&4: 74.

Robinson, Florence. 1997. Inteview by author. Tape recording, Baton Rouge, LA, 31 July.

Schwab, Jim. 1994. *Deeper Shades of Green*. San Francisco: Sierra Club Books.

Subra, Wilma. 1997. Interview by author. Tape recording. Lafayette, La., 20 June.

Templet, Paul. 1997. Interview by author. Tape recording, Baton Rouge, LA, 18 July.

Williams, Patricia. 1998. Interview by author. Tape recording. Lafayette, LA, 8 October.