

After The Fact

A publication of the Institute for Science and Interdisciplinary Studies

December 1997

Farming Fish, Fighting Pollution

Story and photos by Jim Oldham

In our first year working in Ecuador, the Secoya Survival Project has helped the Secoya begin to assess, prioritize, and initiate efforts to deal with devastating effects of oil production and other development in Ecuador's Amazon rainforest. During three working trips to Ecuador we have developed a participatory process in which over two-thirds of Secoya households actively participate and which has identified three



A Secoya woman feeds termites to her fish

strong goals for the next phase of the project: clean drinking water, Indigenous Aquaculture, and responses to environmental threats. In this issue we report on two pieces of our work: an early success in our collaboration with the Secoya to reduce the pollution of their rivers and our plans and rationale for participatory research in aquaculture.

A STORY OF SUCCESS

In our summer issue, we reported on a number of environmental threats faced by the Secoya, including sewage from the upstream oil-town of Shushufindi. At the time that article was written, we had recently returned from Ecuador where we had accompanied a Secoya commission to Shushufindi to investigate the problem. We had just begun conversations with project PATRA, the World Bank funded Environmental Management Technical Assistance Project at Ecuador's Minis-

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Break-out session at the NFFCW, July 97

Two Tape Recorders and a Duct Tape Roll

By Jeff Green

It's 2:00 PM on Thursday, July 17, 1997. The **ISIS Northeast Federal Facilities Cleanup Workshop (NFFCW)** staff completes the last of the important pre-departure details before we concede that we've done all the planning we possibly can, close the ISIS office, and relocate to workshop location. With Career/Pro's help, we've spent much of the week on the phone building interest and support with government and Defense Department (DoD) offices.

Having done as much as we can and with a strong agenda locked in, we load a small pickup truck with the supplies, equipment, and miscellaneous items that will make up the 3 day field office of ISIS at Amherst College. We bring boxes of printed materials, a computer loaded with the database and files, the printer, newsprint, blank tape, video cameras, an answering machine, two tape recorders, and, of course, one brand-new roll of duct tape.

We're hot and miserable, and kicking ourselves for our seemingly questionable decision to host an

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Rainforest Research Helps Secoya Farm Fish

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try of the Environment, regarding how to work with the municipality to stop raw sewage being dumped in the Shushufindi River.

We are pleased to report now that that work, and a follow-up visit in August, has led to one of the most exciting project successes to date: a promising solution to a serious environmental threat and a partnership with Ecuador's Ministry of the Environment to involve the Secoya and other indigenous people in environmental planning and management for the region.

Our meetings in Shushufindi with a wary mayor, the project engineer, and citizens concerned about the health impacts of the pollution gave us enough information to take Secoya concerns, and proposals for development of a biological sewage treatment system, to PATRA. Communications with PATRA over the next few months led to a week-long working meeting in Shushufindi in August with PATRA, the local government, ISIS, and OISE (the Secoya Indigenous Organization of Ecuador), and to the decision on the part of Shushufindi to develop the Constructed Wetlands for Wastewater Treatment suggested by the Secoya. SSP consultant Dr. Ronald Lavigne, of the University of Massachusetts, has agreed (independently of ISIS and OISE), to provide design assistance to the town engineer.

Early intervention, the combined skills of Secoya leaders and SSP consultants, and the fortuitous circumstance of PATRA's efforts in the Amazon being focused on Shushufindi enabled us to initiate a process that will eliminate a major source of pollution. Beneficiaries include downstream communities, both indigenous (Cofan, Siona, and Quichua as well

as Secoya) and colonists, as well as residents of Shushufindi who use the river for laundry and bathing and whose meat packing plant uses water from the river downstream of the outfall. Perhaps most exciting is the success of our collaborative process: Secoya leader Elias Piyahuaje, having investigated constructed wetlands on his ISIS sponsored trip to the U.S.A. in 1995, recognized the potential for constructed wetlands to provide an economical and environmentally sound solution for Shushufindi. This is exactly the type of result we are hoping to bring about when we make scientific and technical knowledge available to the communities we partner.

Another outcome of the project's work in Shushufindi is an invitation from PATRA for ISIS and OISE to help develop an environmental management plan for the Canton of Shushufindi, made up of the town of Shushufindi and several smaller parishes that include the Secoya-Siona territory along the Aguarico River. Involving indigenous people in the planning process is an important goal for PATRA and they have turned to ISIS due to our history of work with the Secoya. We have been asked to help link both the Secoya and the Siona people with PATRA and the local authorities to ensure they have input into the planning process for the region. The opportunity to help represent the environmental and cultural interests of the indigenous people in this process is another piece of the project's work to defend against outside environmental threats.

AQUACULTURE: SETTING THE STAGE FOR (FISH) FARMER RESEARCH

The Secoya interest in developing indigenous aquaculture is more evident with each trip we make to

Ecuador. Every visit we are shown more ponds, meet more people who have begun, or want to begin, farming fish, and learn about experiments with new species and other innovations. The ISIS team has contributed to these efforts by identifying local opportunities for training in aquaculture and sources of young fish (fingerlings) for stocking ponds. The SSP has provided funding for one Secoya from each of the three OISE villages to participate in a three day aquaculture training workshop, and for the purchase of fingerlings (all indigenous species, approximately 150 to each of 20 ponds) to supplement wild-caught fish in Secoya ponds. The team has also begun teaching water quality monitoring techniques and advised on pond construction.

These are necessary preliminar-

After the Fact is published semi-annually by the Institute for Science and Interdisciplinary Studies (ISIS) in Amherst, MA.

We invite you to submit your comments and writing to *After the Fact*. Contributions may be made on paper or on disk and addressed to the attention of the editors at:

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ies to the project's main objective: participatory research aimed at developing sustainable aquaculture for the Secoya and other inhabitants of the Amazon rainforest. With aquaculture, the Secoya are attempting to develop a new food source that will partially replace hunting and fishing resources

innovations to test, and experiment; the role of outsiders is to convene, catalyze, and advise the analysis; search out and provide access to new ideas and materials; and support and consult on experiments."¹

These are roles ISIS and our project consultants have taken on al-



Testing the waters: Secoya aquaculturists check water quality during a pond survey

ready, through site visits, community meetings, research, and outreach to other organizations. In the coming year, we will organize workshops for Secoya aquaculturists, help them obtain needed fish and materials, and collaborate in the design, implementation and evaluation of experiments aimed at problems such as feeding regimes, polycultures, and reproduction in captivity.

Two characteristics of our work make the Secoya Survival Project unusual. First is the application of participatory research to aquaculture. Participatory research in agriculture developed to go beyond the conventional transfer-of-technology model behind the green revolution and so much development work in the "third world," but transfer-of-technology is the model that aquaculture, agriculture's young sibling, still tends to copy. Examples of participatory fish farmer research are few and far between.² Participatory research in agriculture, in collaboration with farmers on their own land, is an approach that has been around for over a decade and is one

lost to development and colonization. They are breaking new ground, working with fish and systems in ways that are innovative not only for the Secoya but also for the world of aquaculture. Neither traditional farmer innovation based on trial and error, informal communication between neighbors, and years of experience, nor conventional science, requiring formal skills and tools, standardization, and replication, can address Secoya needs in a timely fashion. Participatory farmer research, on the other hand, combines the practicality and flexibility of farmer experimentation with scientific techniques such as formal record keeping and reduction of variables in ways that are key to helping the Secoya develop an appropriate aquaculture technology.

Developing participatory fish-farmer research means supporting the Secoya in carrying out activities traditionally conducted by scientists and technical specialists. "In participatory research, farmers analyze problems and needs, choose technologies and

whose practitioners point out is particularly appropriate for supporting the "complex, diverse, and risk-prone" systems of the worlds poorest farmers.

"Participative research ... is a means by which two bodies of knowledge can be brought together and can interact so that the solution of small-scale farming problems can take place over a shorter period of time than in conventional research and with greater confidence that the results will be adopted.

"Participation in this sense not only means that small farmers play a practical role in research by planting trials on their land, but that they also discuss how those trials will be conducted both individually and in group sessions. In general terms, we [seek] farmer participation in defining the problems we [will] tackle, in designing experiments relevant to these problems, in implementing experiments and in evaluating results."³

Participatory research recognizes



Fish are transported, in plastic bags, by canoe, from communal holding pens to family ponds.

that farmers are innovators who experiment and adapt. It acknowledges that the local people are often the only experts knowledgeable about complex farming systems in remote locations, and it understands that people are more likely to adapt new tech-

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nologies if they have had a hand in designing them.

*"[T]he main objective is not to transfer known technology, but to empower farmers to learn, adapt, and do better; analysis is not by outsiders—scientists, extensionists, or NGO workers—on their own but by farmers and by farmers assisted by outsiders; the primary location for R&D is not the experiment station, laboratory, or greenhouse, necessary though they are for some purposes, but farmers fields and conditions; what is transferred by outsiders to farmers is not precepts but principals, not messages but methods, not a package of practices to be adopted but a basket of choices from which to select. The menu, in short, is not fixed ... but à la carte and the menu itself is a response to farmers' needs articulated by them."*⁴

The Secoya have demonstrated their interest and ability to experiment with aquaculture. Our goal is to help them confront some technical and economic obstacles to establishing

fish ponds and then introduce participatory research to allow them to address technical questions as they arise. The second unusual characteristic of our project results from the fact that the Secoya work with a system that is not "traditional." In fact, aquaculture in Secoya territory is less than 5 years old. Normally, the participatory approach is used to increase productivity, security, or sustainability of farming systems that have existed for long periods of time.

In the case of Secoya aquaculture, participatory research is especially applicable because there is no appropriate technology to transfer: culture of indigenous species is still in its infancy and the introduction of the exotic species, just because they have been raised successfully elsewhere, to a region with one of the world's most diverse populations of native fish would be outrageous. Even basic scientific knowledge of taxonomy and ecology of Amazonian fish is lacking, and Secoya knowledge of the local ecology (shared with the other indigenous people of the region)

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is often more complete. In addition, the Secoya are the best judges of what technologies are appropriate to them as a culture in transition.

Aquaculture is being fit into a complex socio-economic system that includes traditional farming, hunting, and gathering, and more recent activities such as work as day laborers, craft sales, and tour guiding; In this sense, it operates like a new technology or crop being incorporated into an established farming system and the principals of participatory research are completely applicable.

1. Chambers, Robert, 1989. Reversals, institutions, and change. In Chambers, R., A. Pacey, and L.. A. Thrupp, *Farmer First: Farmer Innovation and Agricultural Research*. Intermediate Technology Publications.

2. We would be very interested in hearing from readers about any such examples they might know about.

3. Fernandez, Maria E. and Hugo Salvatierra, 1989. Participatory technology validation in highland communities in Peru. In Chambers, R., A. Pacey, and L.. A. Thrupp.

4. Chambers, Robert, 1989.



Promising Genomics: Toward a 'Faster, More Intense' Biotechnology

This is an excerpt from a paper delivered by Michael Fortun at the annual meeting of the American Anthropological Association in November. The full text is available as an ISIS Working Paper. As with all After the Fact articles, comments and feedback are welcome.

The writer John Seabrook has called film director George Lucas "a genius of speed." "Perhaps the most memorable single image in 'Star Wars,'" Seabrook writes, "is the shot of the Millennium Falcon going into hyperspace for the first time, when the stars blur past the cockpit. Like all the effects in the movie, this works not because it is a cool effect...but because it's a powerful graphic distillation of the feeling the whole

movie gives you: an image of pure kinetic energy which has become a permanent part of the world's visual imagination...Insofar as a media-induced state of speed has become a condition of modern life, Lucas was anticipating the Zeitgeist in 'Star Wars.'" Lucas had to rely heavily on pacing and editing, says Seabrook, in part because he had "little rapport with actors." "Harrison Ford told me that Lucas had only two directions for the actors in 'Star Wars'...The two directions were 'O.K., same thing, only better,' and 'Faster, more intense.' Ford said, 'That was it: 'O.K., same thing, only better.' 'Faster, more intense.'"

What's happening in today's ever-accelerating iteration of the biotechnology industry? Are the new "genomics-based" companies appearing on the scene now the same thing as the old biotech companies such as Amgen or Genentech — only better? What would "more intense" mean in what some actors within this world have already started calling the post-genome era?

One effect of our society's hyperspeed is a partial obliteration of the boundary between present and future. One could pursue an ethnography of the faster, more intense biotech landscape via the imagery of the future corporation such as in

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the film *Gattaca* (rhymes with Attica). But I'm less interested in such prison-worlds of the fully corporatized future than I am in those anteriorized futures of today's biotech corporations. The larger project of which this paper is a part attends not to the imaginary future *Gattaca*, but to the disseminated firms competing in the futures markets of biotechnology, and especially its genomics sector: corporations with names like Molecular Dynamics, Darwin Molecular Corporation, Genome Therapeutics, GeneLogic, Digital Gene Technologies, Lexicon Genetics, Pangea, CIPHERgen, Immunex, Hyseq, Clontech, Genaissance Pharmaceuticals, Rosetta Inpharmatics, Exelixis, Affymetrix, Nanogen, Hexagen, Millenium Pharmaceuticals, and finally two that I'll consider in some detail today — Human Genome Sciences, and Incyte Pharmaceuticals. None of these corporations is more than ten years old, and I'll be discussing the particular techno-politico-economic ecology in which this corporate proliferation has occurred.

Here my focus is less on the kinds of microlevel issues where ethnography has an important role to play, tracking the changing experiences and desires of scientists as they negotiate the ever-recombinant intersections and hybridizations among corporate and academic research trajectories. The issues there are quite serious — patenting, access to resources, conflicts of interest, public versus private research priorities, and so on. My focus here is more on the macro level, on corporations themselves as actors, the cultures which they inhabit and perform, and the economies which they are projecting even as they try to survive within their changing demands.

First, a quick compressed hyperspace history of the pre-post-genome era. Around 1986, when the first proposals were floated for a well-funded,

centrally-coordinated effort to map and sequence the entire human genome, not even Nobel Laureate and Biogen founder Walter Gilbert could make the economics work for a genome-based corporation. Neither venture capitalists nor major pharmaceutical companies could envision a quick-enough development of either diagnostic or therapeutic products coming from the new genetic mapping and sequencing technologies. One of the explicit rationales given at the time for a federally-funded and coordinated Human Genome Project was, however, to develop the technological infrastructure, in particular the informatics components of databases and their search tools, that would keep the U.S. biotechnology industry competitive in the globalizing biomarkets. That strategy seems to have worked out remarkably well. The “wet” technologies driving gene sequencing and mapping advanced more rapidly than even the most ardent proponents had hoped possible, while the “dry,” silicon-based technologies of information storage and processing also raced ahead.

Simplifying greatly: the pursuit of the structure, function, and position of individual genes on the 23 human chromosomes (not to mention the chromosomes of other organisms such as mice, yeast, bacteria, fruit flies and flatworms) resulted in the emergence of the complex field of activity named genomics. Genomics is what it sounds like: a recombinant discipline at the nexus of genetics, economics, and technology. Technically, it refers to the science and technology of analyzing not just individual genes, but entire genomes. The goal of the Human Genome

Project is to produce the tools, the knowledge, and the trained scientists to be able to work with not just the gene for cystic fibrosis or the gene for colon cancer or breast cancer, but to be able to think about and work with the logic and structure and po-

The “wet” technologies driving gene sequencing and mapping advanced more rapidly than even the most ardent proponents had hoped possible, while the “dry” technologies of information storage and processing also raced ahead.

tential interactions between multiple genes on a chromosome, and among the 23 chromosomes which make up our genome.

In the early years of the Human Genome Project, both advocates and critics agreed, by and large, that what was going to happen was you would have a small army of researchers and technicians producing maps of the entire genome, putting down molecular markers at regular intervals which would help you locate specific genes, which could then be sequenced, which would then help you cure disease or at least develop diagnostic kits that would let people know if they were “at risk” for a particular disorder. Some people call this the genetic approach, and generally scientists were focusing on a particular disorder and trying to find the gene for it. Often, one necessary resource was a large family that the disorder “ran in.” So we built up, marker by marker, gene by gene, the big picture of the genome. Advocates were optimistic that that big picture would tell you most if not all of what you needed to know about “being human” and allow you to hunt down new faulty genes; critics were pessimistic that the whole scheme was far too simplistic.

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Biotechnology

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What's happening now in both the science and business worlds is that people are talking more about a genomics approach. The genomics approach, again speaking generally, happens less at the laboratory bench and more at the computer terminal. There are huge databases now, accessible via the Internet (although you often have to pay a price), which allow you to scan and cross-reference and link up enormous amounts of sequence information, mapping markers, studies of proteins and protein structure, and which genes are expressed in particular tissue samples, as well as other sorts of information.

By the early to mid-1990s, new niches for biocorporations had emerged along with the emergent practices of genomics. If many of the early start-up companies spinning out of the Human Genome Project were founded on what a few individual genes and gene products could do in the body and in the market, newer corporations like Human Genome Sciences, Millenium, and Incyte could produce and sell something somewhat different. What that difference is, and the effects that difference has, particularly the creation of a "faster, more intense" biofutures market, is the subject of the remainder of this paper.

Between 1991 and 1993, venture capitalists poured nearly \$1 billion into the creation of new biotech companies.

Some of the difference can be traced to changing venture capital flows. Between 1991 and 1993, "flush with cash and drunk with several years of a pumped up IPO market," in the words of one industry

analyst, venture capitalists poured nearly \$1 billion into the creation of new biotech companies. Incyte and Human Genome Science were among the genomics companies formed at this time, but they were somewhat exceptional. Most of the companies formed a "frightening stampede of one-trick ponies," burning cash with only a few patents or technologies and no present or immediate future products. A three-year "winter" set in, with venture capital investment dropping dramatically. Lately, with the stock market peaking still higher, venture capital has thawed and is flowing back in to biotech, but with a new focus. "Tools are hot right now," says an analyst with the venture capital firm Kleiner Perkins, and another investor explicates some of the logic: "you don't have the FDA to contend with, they take less capital and you can go public earlier." The trade-off is long-term growth, and another shift in this ecology is likely in the new few years.

But venture capital is only one part of the difference-making machine in biotech, and if it created a stampede of one-trick ponies, other metaphorical animals had to be reckoned with more seriously.

"What's the grey powder between an elephant's toes?," asks Mark Edwards of Recombinant Capital — or ReCap for short, since we're all pressed for time — a San Francisco-based organization which tracks and analyzes the biotechnology industry for biotech corporate executives and venture capitalists. The answer: "slow-moving natives." "Dancing with elephants" is Edwards' metaphor for the interactions between the major pharmaceutical companies, or "pharma" for short, and the new biotech and genomics start-ups.

"Biotech alliances with pharma are our "dances," and on this basis we've been dancing together for some time.

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Yet, at another level, this analogy becomes troubling — perhaps it is really the elephants themselves who are dancing, either individually or with each other, while biotech is simply engaged in the precarious enterprise of inhabiting the elephants' dance floor, moving nimbly around the massive bodies until...Until what? Dancing with elephants is not a particularly promising strategy for growing up to be an elephant, even if one is lucky enough to have been born as a baby elephant. What if new elephants dance differently, or the elephants change their dance? The point of these musings is simply to observe that, for an industry that 'dances with elephants,' we don't know very much about how, when or why elephants dance. In the past we have relied on our fast reflexes and quick recognition of the relatively few dance steps used by most elephants. Now, however, new elephants have taken the floor and the steps are more complicated."

The genomics dance marathon is one of the quick and the dead, survival of the fastest in an increasingly complicated and differentiated economy. As venture capital became more scarce in the mid-1990s, the big pharmaceutical corporations became a key source of financial and other resources, through novel licensing and research arrangements. Human Genome Sciences and Incyte have adopted different dance steps with their outsized partners in the pharmaceutical industry, but each can be seen as operating in a kind of futures market.

When Human Genome Sciences was formed in 1992, it immediately had the basis for a large commercial genomic database from its partnership with the non-profit Institute for Genome Research, or TIGR. TIGR's Craig Venter, formerly of the NIH, had developed enormously genera-

tive production technologies that spewed out genes, gene fragments, RNA probes, mapping positions, and sequence information, which made Human Genome Sciences database among the largest and most useful. “We were out there ahead of others,” said HGS president William Haseltine. HGS was faster, more intense. In July 1993, Human Genome Sciences signed an exclusive deal with the pharmaceutical company SmithKline Beecham, in which SmithKline got first rights to develop products based on what it found in the HGS database. HGS got \$125 million, a huge amount of money by biotech standards. A SmithKline senior vice president also cited speed as one of the key factors: “We got the data two years ahead of anyone else...We bought HGS’ database to expand our product line, to build our business in the future...We’ve skimmed the cream that’s relevant to our portfolio,” and the rest of the information can be resold.

Incyte did a different dance. When it incorporated in 1991, they had a few interesting proteins that weren’t going anywhere. When it went public in 1993, Incyte declared it would focus on genomics databases rather than drug development, dry rather than wet, silicon over carbon. What I didn’t mention before is that during the “winter” of venture capital in 1993-96, the Internet had started to happen. Using relational databases and HTML interfaces, Incyte has built several databases now — LifeSeq, ZooSeq — but sells non-exclusive access to them, rather than exclusive. So instead of \$125 million from one customer, Incyte has taken in \$15-20 million from Pfizer, from Upjohn, from Hoechst, from Hoffman LaRoche, from Glaxo, from Johnson and Johnson. Pfizer was the first to sign on, and one of their executives commented on the HGS-SmithKline deal: “offering such mas-

sive amounts of sequencing information was a bit like a firehose trying to fill a teacup of subsequent experiments.” Pfizer and the other major pharma investors were also buying Incyte’s ordering of the information, and the LifeTools software that linked gene sequences to other homologous genes sequences, to protein studies, or to particular tissue samples which showed individual variation in gene expression. Uploading the body’s

At least a few corporations can thrive in this quickened economy not simply by promising new therapeutics or diagnostics, but by promising promises.

information to the Internet surely counts as what Seabrook called a “media-induced state of speed.”

Incyte’s corporate strategy has been described as “more like a software company than a biotechnology firm.” This hybridization between the gene and the chip is evident on many levels in the worlds of genomics, from the corporeal to the corporate. Most recently, Incyte President and Chief Scientific Officer Randy Scott has himself been described as “a product of Silicon Valley, where suing a company in the morning and then inking an alliance with them in the afternoon is just another day in the high-tech fast lane. Valleyites call the attitude ‘co-opetition.’” Even corporate competitors like Incyte and SmithKline can hybridize in new ways in the rapidly mutating biopolitical economy. Incyte and Smith-Kline have now formed a joint venture diagnostics company called diaDexus, from the Greek *diadexus*, meaning “presaging good fortune, in anticipation of future discoveries.”

Anticipate: “to answer (a question), to obey (a command), or to sat-

isfy (a request) before it is made.” What’s being anticipated, what’s being promised in this time and place of a faster, more intense genomics? The readings double, and double again, as suggested by the common conjunctive phrase “promises, promises.” A promise is simultaneously obligation and uncertainty, binding agreement and unbound future. At least a few corporations can thrive in this quickened economy not simply by promising new therapeutics or diagnostics, as the biotechnology industry always has, but promising promises: promising access to databases and their possibilities; promising leads to new drugs in exchange for cash or equity, leads which are of course themselves called “promising leads;” promising the computer interfaces that can establish new connections between an expanding array of virtualities and actualities, and much in between.

Promises, intensities: sending forth, stretching towards, stringing tightly and stringing out. The future — whatever that means — now. Or at least an option on it, a risky bet, valued like any other derivative according to the tightly stretched equations that try to pull a possible future into an impossible present. Among the many things that the faster, more intense genomics corporations promise are what we might call *new zones of intensities*. I doubt that the Human Genome Project or the new genomics corporations were ever designed, or that their scientists ever desired, to produce a fuller, more adequate “representation” of what an organism, human or otherwise, is. That supposedly traditional goal of the sciences is rapidly becoming a quaint relic of the past.

Genomics isn’t promising to build the “full picture” from little bits and bytes of the organism, and hence the standard anti-reductionist cri-

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The Northeast Federal Facilities Cleanup Workshop, July 1997:

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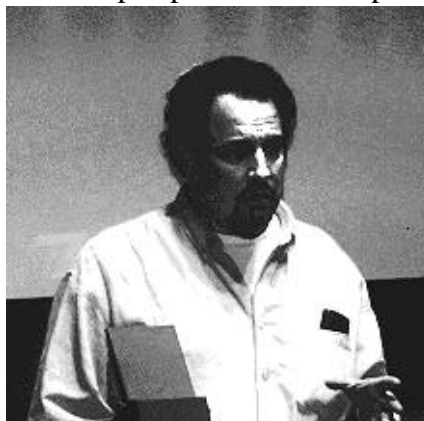
event any time between May and August. It's a roaster of a day, of the nastiest kind of New England weather — mid 90's, in both temperature and humidity. And although we've moved all sessions to Converse Hall, the coolest building on campus, we're less than excited at the prospect of welcoming overnight guests to anything but the campus pool in this stifling weather. So we hope that the weather forecast is on the mark, and this several-day heat wave will now pass after one rainy night. We put the forwarding number on voice-mail, lock the ISIS office, and drive off to the site of the workshop.

Though dozens of concerned citizens have registered to attend, we would still like to broaden government participation in the event. To our surprise, it has been more difficult to consistently win the interest and commitment of both regulatory and cleanup-ended government officials. In many cases, people feel overworked and understaffed, and one state actually pleads poverty, it's the first year in several that they've been able to avoid layoffs.

The NFFCW had its very beginnings in 1995 with a series of conversations and email exchanges with CareerPro's Lenny Siegel and Aimée Houghton. At that time, CareerPro had raised funds to do its second major workshop on military cleanup advisory boards, and was planning to ex-

pand the project to a national scale based on regional collaborations. As ISIS's military cleanup project coordinator, I attended Getting On Board II to observe CareerPro's workshop, and to discuss collaboration on a northeast event. Duly impressed with the method, tone, and quality of the workshop series, we agreed to host a northeast event as soon as the funds could be raised.

At the end of 1996, USEPA awarded a grant for a five-workshop series on public involvement in federal facilities cleanup, in collaboration with ISIS and several other organizations. CareerPro then turned over responsibility for a northeast event to ISIS. In January 1997, ISIS hit the ground running to plan and organize the NFFCW, a three-day event designed to strengthen community oversight and input in the cleanup of military bases. We set out to bring people who live with the effects of pollution at military bases throughout the northeast together to share perspectives and experi-



Lenny Siegel of San Francisco State University's CareerPro.

ence and educate each other about issues including community organizing, the ethics of risk assessment, environmental justice and the local workforce, military cleanup processes, and environmental policy.

The ISIS event would include a new addition to the programming of the previous events, a pre-workshop Citizen Caucus designed as an opportunity for interested community members to meet, compare notes, and reach "the same page" about their expectations and goals for the broader workshop. This special event integrates the ideas and experience of other groups working on the cleanup issue, including ArcEcology and the Military Toxics Project, and is sponsored by grants from Common Counsel Foundation, Physicians for Social Responsibility, Blue Mountain Center, and the contributions of several individual donors.

Back to our story: At Mayo Smith House we set up the ISIS temporary office and prepare for early guests, and people begin to arrive just as the predicted rainstorm hits. As we hoped, the storm front also brings cool weather. The staff and volunteers order pizza and spend the evening assembling packets and working on last-minute adjustments to our strategy and presentations. For the most part, we work on restructuring the Citizen Caucus to adjust for an unanticipated hitch — several people from military and gov-

A Collaboration of Base Stakeholders

ernment offices have requested to attend the citizen-focused event. Rather than asking them to participate only as observers, we decide instead to do a split session by roles in cleanup.

FRIDAY, JULY 19 — CITIZEN CAUCUS

On Friday morning the Citizen Caucus begins with a discussion of the goals and reasons for attending. Some people want to learn about practical aspects of cleanup like legislation, policy, contracting; some want to network and develop strategies to apply in their communities; and some have come to compare notes with members of other boards.

After lunch, we split into two groups so that participants will meet separately according to their role in the cleanup. With the assistance of a Westover Air Base engineer, those who are employed in cleanup work or regulatory oversight attend a historical tour of a former Strategic Air Command bunker that is carved into the side of a nearby mountain, a haunting Cold War legacy in our own community.

Those who simply reside in affected neighborhoods stay to discuss the challenges they have encountered. People talk of needing to better define RABs in the absence of guidance; of getting the government and advisory boards to listen to and respect each other; of “foot-dragging” by various bureaucratic players; and of vulnerability of advisory boards to the

varying level of commitment of the military’s cleanup project managers. The session is followed by a panel discussion on advocacy work, networking, and handling technical information.

The two groups reconvene for a session on “What Works” — responses include working closely with an independent technical consultant, raising awareness through media coverage, and careful attention to meeting dynamics and format. The afternoon also includes a presentation by CareerPro’s Aimée Houghton and Colorado Senior Assistant Attorney General Vicky Peters, on a very recent success in citizen networking that has resulted in powerful input on the Defense Reform Act of 1997. The caucus concludes in a brainstorming session on possible outcomes and follow-up. The participants recommend careful mapping of various options throughout each site’s cleanup process to guide citizen oversight, monitoring ongoing military activity to prevent future pollution, reaching out to colleges and universities for support, annual conferences for community members to help building citizen networks.

Later that night, at the opening reception, Hampshire College president Greg Prince welcomes Congressman John Olver, who officially opens the conference with observations on citizen involvement in government. Congressman Olver’s office has been an enormous help to concerned citizens, enabling them to make significant progress on several as-

pects of local military pollution problems.

SATURDAY, JULY 19 - WORKSHOP DAY I

The first day of the workshop starts with a brief introduction by Aimée Houghton, who speaks about CareerPro’s work, the history of its workshop series, and about the process by which Site-Specific Advisory Boards became a part of the military’s cleanup process. Aimée encourages participants to take the “long view” of their work by broadening their awareness to the national scale as they work on their local bases. Aimée leads the group into around-the-room introductions.

Tad McCall, the Air Force Deputy Assistant Secretary for Environmental Safety and Occupational Health, then gives a talk about Cleanup Initiatives and Progress in the Air Force. Tad focuses on the importance of citizen input in the cleanup process, to help the services achieve better solutions, and describes internal shifts in the Air Force toward an integration of pollution prevention and environmental safety and health into its daily operations. When asked for suggestions on difficult issues such as how to deal with military cover-ups and tight control over environmental studies, Tad stresses the importance of citizen persistence, and of Congressional support, and urges participants to reach out to their rep-

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Military Cleanup Conference: "a Sense of Camaraderie"

Continued from page 9

representatives.

The next session is a panel discussion on Cape Cod's Otis Air National Guard Base/Massachu-



Cape Cod Times reporter Ann Brennan interviews Lenny Siegel at the Workshop

setts Military Reservation, one of the country's most complicated and difficult military pollution cases. This site has very possibly the largest and most publicly active community participation program in the military's. Otis is also the site of a precedent-setting cease-fire order, which was imposed by EPA to protect the sensitive underground water supply. The panel represents many of the diverse perspectives involved in the cleanup, and includes Andrea Papadopoulas of the Massachusetts Department of Environmental Protection (MADEP), Virginia Valiela of the Town of Falmouth, Sue Walker of the Association for the Preservation of Cape Cod, Vanessa Musgrave from the base's cleanup program, and Jim Murphy of EPA Region One.

The Otis panel is followed by a discussion of legislation, regu-

latory policy, and oversight by Paula Fitzsimmons of EPA Region One, Anne Malewicz of the Massachusetts Department of Environmental Protection, Vicky Peters, and Richard Pease of the New Hampshire Department of Environmental Services. The presenters emphasize aspects of state and federal laws and policies which integrate stakeholder involvement, evolution of these laws and policies, and needs for the future.

Next, National Environmental Justice Advisory Committee (NEJAC) member Haywood Turrentine, of the Laborers' District Council Education and Training Foundation, speaks about environmental justice for the local work force at closing bases. He presents the history and purpose of NEJAC, an advisor to environmental regulators, and stresses the need for ongoing integration of environmental justice issues into cleanup processes. Haywood proposes an innovative training and certification program in cleanup methods and technology for the local workforce that is displaced by military downsizing. Future contracting should also prioritize employment of local workers in cleaning up the sites in their communities.

The day concludes with breakout discussions on active bases, where ongoing environ-

mental impacts and pollution prevention are important; on closing bases, where land transfer, reuse, and economic recovery are major issues; and on mixed cases, where changing mission, restructuring, and downsizing significantly affect cleanup decisions.



Susan Falkoff of Watertown Citizens for Environmental Safety

SUNDAY, JULY 20 - WORKSHOP DAY II

On Sunday morning, we begin with a talk by Career/Pro's director, Lenny Siegel, on community participation in the cleanup process, and principles of partnership. Lenny's talk touches on five key strategies to successful community involvement: understanding the process, learning to set priorities, offering advice, developing credibility, and being prepared to go

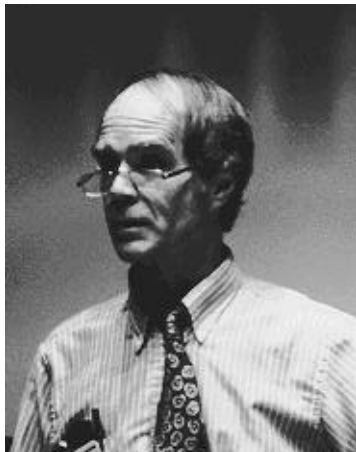
public.

Susan Falkoff of Watertown Citizens for Environmental Safety then presents a case study of how her organization started the first Restoration Advisory Board at the Watertown Arsenal. Susan highlights the long history of her community's effort, and how they overcame some of the impediments they encountered in achieving strong input to the cleanup. Susan's talk stimulates excellent questions and discussion on citizen participation.

The next presenter is Dr. Ted Schettler, of Physicians for Social Responsibility, who analyses the use of human health and ecological risk assessments in cleanup decision-making. Ted points out that risk assessment has ethical biases, lending itself easily to cost-benefit or risk benefit analysis, but failing to incorporate many of the needs of at-risk people and the environment. Ted also points out that because objective assessment cannot be made using this decision-making tool, the at-risk community must be closely involved in all phases of the process to assure that their needs are met.

Col. Craig Postelwaite, of the Air Force Office of Environmental Safety and Occupational Health, presents an Enhanced Site-Specific Risk Assessment

method. According to Col. Postelwaite, the method will lead to more efficient cleanup work while protecting health and the environment. This will be accomplished by working more closely with potentially affected people, and by lowering standards based on realistic future land-use determinations.



Dr. Ted Schettler, of Physicians for Social Responsibility

Lenny Siegel leads the last plenary session, which is on budgeting, funding and priority setting. Lenny gives a brief overview of cleanup-related budgeting processes, from congressional appropriation on down through each military service's chain of command, to local level.

The group then breaks into several roundtable discussions on a range of topics, led by Bob



Col. Craig Postelwaite at the NFFCW

Schaeffer of the Military Production Network, Aimée Houghton, Ted Henry of the University of Maryland Program in Toxicology, Susan Steenstrup of the MADEP, and Robert Rabin Siegal of the Committee for the Rescue and Development of Vieques, Puerto Rico.

In the End

In all, over 70 people participated in the 3-day of the Caucus and Workshop, including 34 concerned community members, 2 environmental consultants, 15 officials from local, state, and federal government, and 14 military cleanup personnel. In writing this article, I asked Aimée, CareerPro's main workshop organizer, what stood out in her memory of the NFFCW event. She said she was most impressed by the level of camaraderie among the participants and the retreat-like spirit of the event; people rolled up their sleeves and got the job done with an across-the-board clarity about the goals and purpose, and a great willingness to work together.

It was great to see that all the post-workshop evaluations were highly positive. One environmental regulatory official said it was the best conference on citizen participation he had ever attended. Another initially skeptical citizen said she had been dubious about the workshop -- was prepared to leave and return home. But the Citizen Caucus helped her see where ISIS "was at," and she ended up staying all three days -- and "Learned a lot, too!"



MCS Initiative: Endings & Beginnings

By Karen Sutherland

This fall, ISIS's Multiple Chemical Sensitivities (MCS) Initiative has completed two important projects funded by grants from the U.S. EPA and the Community Foundation of Western Massachusetts (CFWM). These projects redressed serious problems faced by local people with MCS that resulted from their exposure to environmental toxins, compounded by their marginalization, exclusion from services and policy decisions, and lack of available information. The funding period was one of intense work and accomplishment in many arenas. The projects successfully:

- * Facilitated the organization and growth of the Environmental Health Coalition of Western Massachusetts to a self-sustaining organization with a diverse membership of 291 persons interested in working towards a healthier local environment. People from different sectors (e.g., health care professionals, builders, etc.) work together in Study/Action (S/A) groups, increasing collaboration and mutual understanding. For example, the "MCS in Schools" S/A group is composed of teachers with MCS, a nurse with MCS, a consultant in the use of nontoxic cleaning products, and concerned parents; together they developed a packet of educational materials (e.g., how to recognize MCS in children and information on nontoxic cleaning supplies) distributed at the "Improving Indoor Air Quality (IAQ) in Schools" conference.

Both by modeling leadership/activist behavior and by facilitating their efforts, project staff have helped people with MCS become more effective in meeting their own

needs. Coalition meetings have also helped alleviate the social isolation of people with MCS, while providing practical information about how to improve their situations.

- * Operated the MCS Resource Center (CORE) which fielded 322 requests for information on 575 topics. CORE has become the first contact point for the MCS community and is beginning to be known by the general public and by such agencies as First Call for Help, which serve

Project staff have helped people with MCS to become more effective in meeting their own needs.

people in need. It serviced requests from people with MCS, government agencies, doctors and medical researchers, health care and other social service agencies, attorneys, business persons, etc. For example, its consulting has helped the Office of Technical Assistance for Toxic Use Reduction (Department of Environmental Affairs) to formulate recommendations for nontoxic procurement policies.

- * Identified and reached local people with MCS (190 as of this writing) and at risk of developing MCS, providing information, networking, and organizing and training for self-help through modeling and facilitating their involvement in Study/Action groups working on environmental health issues in housing, health care, and schools.

- * Reached many hundreds of decision-makers/stakeholders and provided trainings to key individu-

als in health care, schools, and housing, including boards of health, health agencies, nurses, and doctors; teachers and administrative and maintenance staff; and architects and builders. All such trainings included people with MCS, whose experience and expertise became part of the training. Evaluation results show increased understanding of MCS and identification with the issues.

- * Produced resource guides and other publications that have been used at other conferences, by government and other agencies, as well as for our own events and people we serve. Video and audio tapes of project events have been popular requests through our affiliated state MCS groups, the Massachusetts Association for the Chemically Injured and the Environmental Health Coalition as well as through Internet lists.

- * Produced events to educate the general public as well as professionals. Our successful "Improving IAQ in Schools" conference, reported in the last issue of *After the Fact*, also spawned at least two copycat conferences of which we are aware and was one of the factors moving a local school system to switch to nontoxic cleaning supplies. Another highly acclaimed event, "Emerging Environmental Epidemics: Ethics, Health and Human Rights in Chemically Induced Illnesses," brought philosopher Tom Kerns from Washington together with Barry Elson, M.D., and ISIS MCS Initiative Director, Karen Sutherland, for a presentation and panel discussion at Smith College.

- * Established collaborative and ongoing networking with local non-

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MCS agencies that greatly increased their understanding of the isolation and needs of people with MCS. Some of them have begun requesting fragrance-free attendance at their events to further raise consciousness and allow participation by the MCS community. Another has undertaken a major production/marketing campaign to produce woolens without pesticide or petrochemical residues, simultaneously developing the viability of local sustainable agriculture.

* Attracted favorable local and national publicity for MCS. Articles have appeared in local newspapers and in the national publication *Indoor Environment Review*. A local radio talk show focused on MCS and project activities, and the local PBS television station is considering a show about MCS. A video was made of our training on housing by filmmakers from the Boston Self-Help Center to be used to train visiting nurses about MCS. We also see increasing signs that the local public is becoming more accepting of and less hostile to people with MCS. Media articles over the past year have been increasingly favorable. Although some of the change in attitude locally is due to the project, much is also a function of publicity on Gulf War and chemical toxicity issues and a function of the increasing chemical sensitivity of the general public. Almost everyone we meet now either is or knows someone with some degree of chemical sensitivity.

* Designed and conducted a demographics and needs assessment survey, preliminary results of which (based on returns of 40 of a potential 186 respondents) show that the local MCS population is indeed a disabled, isolated, low income sector whose financial, health and so-

cial difficulties were consequent to their development of MCS. (Our respondents are, for the most part, well-educated females, average age 44, who experience disability due to unavoidable exposure to ubiquitous low-level pollutants. Most had held full time professional jobs prior to developing MCS, but now find themselves too sick to work at all or more than part time, and then mostly from within their own homes, with dramatic losses in income. Most receive no public assistance and find that their health insurance covers only a small part of the costs they incur in dealing with their MCS. The gap is filled sometimes by dependence on well partners or family, or by depleting savings, and most often by severe compromises on obtaining needed treatment and lifestyle modifications.) To our knowledge, this is the first survey of its kind on any U.S. MCS population. Results of the completed survey will be widely distributed amongst stakeholders, to various MCS groups across the country, and through professional and scientific publications, and will be used as the basis for continuing Coalition work. The survey instrument itself has been requested for use by a number of regional MCS groups, opening possibilities for developing a more general picture of the characteristics and needs of the "identified" MCS population.

All of this and more (a more comprehensive report is available upon request) was accomplished with less than \$28,000 in grant funds and donations, enabled by generous amounts of volunteer time. The Initiative is now at a critical developmental stage, no longer able to rely on massive volunteer efforts. The EPA and CFWM funded projects have provided national visibility and acclaim. Much remains to be done.

*We are looking for an accessible space in which to house the CORE Resource Center so that it may function as a self-service facility, perhaps with trained peer volunteers, and relieve project staff of time necessary to service call-in resource requests.

*Survey returns are rich with data important for understanding the local triggers for MCS and demographics and needs of the local MCS population. We want to do a thorough analysis and publication of results. We also want to refine the survey instrument prior to its use nationally. A crucial need is to find a way to reach and survey less-educated people with MCS and those in marginalized social groups.

*We want to continue facilitating and supporting the learning and working together of doctors, researchers, support personnel and other professionals, with people with MCS, as well as their international networking.

Clearly these two projects have been enormously successful in identifying and meeting prioritized needs of the MCS community; facilitating community members' abilities and self-confidence; organizing them for effective self-representation; and changing researchers, doctors and other professionals through education and through their non-hierarchical interaction with people with MCS. The Initiative has also stimulated internal ISIS discussion as to how it fits within ISIS's mission, and how the Initiative might incorporate biomedical research as part of its focus. We welcome ISIS members' ideas, opinions, and suggestions for such an expanded scientific component. Financial contributions are also needed to keep the Initiative moving and are greatly appreciated.



Seminars Broaden the ISIS Community

By Abby Drake & Jacob Bornstein

The ISIS Seminar Series has enjoyed another successful season, with outstanding speakers and attendance at an all-time high. Among many widely-renowned speakers this fall, we have heard from Dr. Everett

local communities, ISIS seminars are one of the staples of our science analysis work and embody our commitment to making science democratic and inclusive.

On October 15th, over fifty students, faculty, and community members from the Five College area and beyond attended Dr. Mendelsohn's exciting lecture, *Human Genetics and the Ideological Allure of Eugenics*. Professor Mendelsohn began his talk by recounting the recent media blitz about the cloning of a mammal, Dolly the

evolution of universes. This theory was designed to solve a major problem that he currently sees in physics: there are eighteen or nineteen parameters, such as the mass of the electron, which are necessary for all of our physical laws to hold. Very small variations would make it impossible for any type of complex structure to occur. Scientists, however, see no reason for the parameters to have worked out so perfectly. Smolin attempts to avoid the notion of a designer by applying evolutionary theory to universes. In other words, the parameters that enable our laws to hold are not fixed in history, but rather developed (and continue to develop) through time.



Lee Smolin chats with seminar attendees

Mendelsohn, head of the History of Science Department at Harvard University, and Dr. Lee Smolin, a Hampshire alumnus who is now Professor of Physics for the Center for Gravitational Physics and Geometry at Pennsylvania State University.

Continuing in our efforts to present ISIS's unique perspective on reconstructive science, the seminars reach out to all interested to encourage critical thinking and greater engagement in science and technology, ubiquitous forces in our world. With participants from the academic and

using this example, Dr. Mendelsohn argued that today's scientific pursuits are entangled with economic structures. Specifically, he warned against letting this structure define our research on humans. In the end, he proposed that a regulatory board should oversee such experimentation and guide its ethical and political components. "We need to think about the ethical implications of our experiments before



Thomas Kerns as Dr. Edward Jenner

Rounding out the semester's events were Dr. Thomas Kerns, an expert on medical ethics; Mary James, a distinguished physicist who happens to be African-American, a woman, and a Hampshire grad; the Honorable Mark I. Bernstein,

posing the question of legal vs. scientific "truth;" Judith Helfand, an activist filmmaker prenatally exposed to the carcinogenic drug DES; and two representatives from the Ecuadorian government who work with the Secoya (see the article earlier in this issue).

This fall's seminar series has carried on the ISIS tradition of unconventional, critical analysis of science and its interaction with society. To reach the widest audience possible, each one is tape recorded. Seminar recordings are available from ISIS: see the order form at left.



Fall 1997 ISIS Seminars Order Form

Each Seminar is \$5.00 (for dubbing and S&H)

- Everett Mendelsohn: Human Genetics and the Ideological Allure of Eugenics
- Lee Smolin: The Life of the Cosmos
- Thomas Kerns: Dr. Jenner's Incredible Smallpox Vaccine Experiment
- Mary James: Science and the Inner Sanctum
- Environmental Management in Ecuador
- Mark Bernstein: Judges, Experts, & Science
- Judith Helfand: A Healthy Baby Girl

I have included \$_____ for the tapes. Thanks!

they have already been performed."

Another crowd assembled to hear Lee Smolin speak on October 27th. Dr. Smolin discussed his new book, *The Life of the Cosmos*. In the book as well as in the lecture, Smolin proposes the possibility of the competitive

Biotechnology

Continued from page 7

tiques of genomics and the Human Genome Project will miss their mark. Genomics is creating new zones of intensities, places in and between the laboratory, the corporation, the experimental assemblages, and the biochemical multiplicities of our bodies, where differences are created, become different from themselves, and recombine with other differences. The successful scientists and corporations will be those who can continually re-arrange software, hardware, wetware, and infoware into new hybrid combinations that create new intensities, perform new biological effects—and who can do so ever more quickly. Not quite the “pure kinetic energy” announced by Lucas’s “Star Wars,” but certainly the ever-hotter pursuit of more, and more intense, productive linkages between virtualities and materialities. Arrival isn’t promised by genomics; new becomings are. That’s not to say there aren’t ethical, legal, and social questions involved in such promises, but only that nostalgia for a holistic, organic body represented and served by a social order, corporate or otherwise, won’t be much help in this promised future.

Becomings? Differences? Intensities? These words are my own risky trades in the “theory-futures market;” their potential value has yet to be established. I can’t fully account for them just now in this initial public offering. But I promise to work on them, and maybe, in time, we can work out a deal.



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