

After The Fact

A publication of the Institute for Science and Interdisciplinary Studies

June 1998

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In the GeneWorld

Or, Becoming Unstuck in Dresden

By Mike Fortun

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By chance, I was invited to speak at a conference on “Nature and Culture” at the Deutsche Hygiene-Museum in Dresden, Germany in April. Well, not exactly by chance. Such chance events usually have a kind of structure to them, or around them, or somewhere in the vicinity. It’s all about connections made and broken, and in this case, a speaker begged off at the last minute but suggested me as a replacement. The conference organizers agreed, and I accepted, in part because the conference had a great subtitle, “The Inexorable Dissolution of a Modern Distinction.” Billy Pilgrim, the protagonist of Kurt Vonnegut’s *Slaughterhouse Five*, gradually comes to accept and even enjoy the fact that he has “become unstuck in time,” oscillating between the fire-bombed ruins of World War II Dresden and extraterrestrial romps on the planet Trafalador. With Vonnegut’s novel on my mind, it pleased me (*es tut mir leid*, as the German expression goes, one of the few that sticks in my brain) that my first pilgrimage to Germany would take me to the city Dresden, which until the reunification of Germany had been a part of the East. “Becoming-unstuck” and “inexorable dissolution” served as good working metaphors during my wanderings in the city, the conference, and its accompanying exhibit.

By ordering 1,400 planes to drop high explosives and 650,000 incendiary bombs on Dresden on Feb-

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Amazon De-Briefing, ISIS Style

Secoya Survival Project Coordinator Jim Oldham has just returned from another trip to Ecuador. As an alternative to the update articles we’ve done in the past, we’ve excerpted part of an interview that Mike Fortun did with Jim as part of ISIS’s work to document and analyze its own projects. He reports on work with the Secoya, their organization (OISE), and our project.

MF: When and why were you last in Ecuador?

JO: May 3-12. OISE was having its annual congress, a three-day event when they choose officers, do normal business, and so on. In March, OISE had voted to annul their earlier agreement with Occidental Petroleum, and were now going to decide whether or not they wanted to negotiate a new agreement. The earlier agreement was one of several that they’ve had over time. It was signed in May or June of 1997 and gave Occidental permission to come into Secoya territory and explore for oil. In return for the right to do seismic testing, the oil company gave them some material goods, from wheelbarrows to outboard motors.

MF: Why did OISE change its mind?

JO: Two reasons. One, they came to realize – partly from thinking about the things they had gotten from the company, partly from talking to other people who knew more about Occidental’s wealth – that they had not received much in return for what the company was getting.

MF: Who did the Secoya talk to, to realize that?

JO: A wide range: tourists who came through, people like us who are working in the community on a regular basis, anthropologists, missionaries. Pretty much everyone who has contact with them, other than the oil company people themselves, felt that it was a bad agreement, and most of them said it in one way or another in private conversations. There was some organizing work

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ruary 13, 1945, Winston Churchill dissolved the fine modern moral distinction between military and civilian targets. Vonnegut, a prisoner of war in the city, described his experience:

“We never expected to get it. There were very few air-raid shelters in town and no war industries... We went down two stories under the pavement into a big meat locker. It was cool down there, with cadavers hanging all around. When we came up the city was gone... They went over with high explosives first to loosen things up, and then scattered incendiaries... They burnt the whole damn town down... One hundred thirty thousand corpses were hidden underground.”

The 16th century palace, the magnificent opera house, the Zwinger art museum, and many other not-so-famous buildings were restored during the Communist era. A lot of ugly, drab buildings are left from that period, too. Now, the

many construction cranes piercing the skies over Dresden testify to the attempt to stick this beautiful city back into time, or time back into the city. Whatever the case may be, the operation depends on sticking large amounts of formerly West German capital and technical expertise into this city on the Elbe River in southeast Germany, near the border with the former Czechoslovakia, where thousands of emigrants once crossed. New buildings are going up, but much WWII-era rubble remains in their midst, ordered along long metal shelves, a past awaiting reinsertion and reconstruction. In the case of the famous Frauenkirche (Church of Our Lady), one huge hunk of rubble will be preserved where it fell, while the new-old edifice rises around it. Dissolution permanently stuck, in the hope of a future’s memory.

The Deutsche Hygiene-Museum is a rather imposing structure. It was built in 1927, during the Weimar years, a monumental project of Karl Lingner, who made his fortune in the manufacture of Odol mouthwash and its packaging

and sale in a famous hook-shaped bottle. Between 1933 and 1945 the museum was part of the National Socialist racial hygiene machine. Partially destroyed in the fire bombing, it quickly reopened in 1945 as the Institute for Hygienic and Medical Propaganda of the German Central Administration for Health in the Soviet Zone of Occupation. Its biggest claim to global fame is as the source of all those “Visible Man” and “Visible Woman” (not to mention the Visible Horse and Visible Cow) models that made their way into science museums worldwide in the 1950s and 1960s. (The workshop part of the museum which produced these models was privatized in 1990.) Since 1991, it has featured over 75 exhibitions such as “Darwin and Darwinism,” “The Pill: Of



The museum that mouthwash built

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ISIS

Hampshire College box PH
P.O. Box 5001
Amherst, MA 01002-5001

or via email at:

isisGU@hampshire.edu

or by fax at:

(413) 582-5448

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Managing Editor:

.....Michael Fortun

Production Editor:

.....Scott Tundermann

This issue's contributors:

.....Herbert Bernstein

.....Abby Drake

.....Jim Oldham

Pleasure and Love,” “The Human Heart in Medicine and Culture,” and the one that accompanied the conference I attended, “Gene Worlds – Workshop Man?”

The “Gene Worlds” exhibition is one of five simultaneous exhibitions on display this year; the others are at museums in Bonn, Mannheim, Munich, and Vevey (in Switzerland). Anyone going to Germany this year should definitely check them out. While I’ve only seen the catalogues for the others, they all look to be as interesting and provocative as the one in Dresden.

The exhibition, organized by Dr. Birte Hantke, was the best I’ve seen on the subject of genes – and I’ve seen more than a few. It was a fantastic combination of detailed history, great technical explanations, wonderful visuals, and non-didactic explorations of social and ethical issues. I was most impressed by the direct incorporation of art into this basically scientific exhibition, something you’d be extremely unlikely to see in an equivalent show in this country.

For example, as a kind of preface before the exhibit, you walk by a few whimsical chimeras, like a skunk with a fan of tail feathers, and a platypus with the graceful neck of a goose. They were from the sculptor Thomas Grünfeld’s “Misfit” series; the sheep with the ostrich head pictured on the front page is from the same series, but was displayed in the exhibition at Bonn. While the catalogue interprets them as “alienating,” they cracked me up. And while a few parents shook their heads and *tsk-tsked*, their kids loved them.

Entering the exhibition proper, the first thing you encounter is a faux-stone bust of Charles Darwin

which, without any warning, opens its eyes and moves its head through the series of well-defined emphatic positions that we know from professional news anchors, or the animatronic occupants of Disneyworld. This Darwin talks (in German) about his theory of heredity. It’s a nice ironic touch, given that Darwin’s theory of heredity turned out to be not as robust as his theory of natural selection – which is the science historian’s polite way of saying it was wrong.

An excellent historical section runs through genetics research from Gregor Mendel through T.H. Morgan and Watson and Crick to Kary Mullis, winner of the 1993 Nobel Prize in chemistry for the invention of the polymerase chain reaction

in brilliant jewelry.” But it wouldn’t be forbidden to translate the latter clause as “...markets, as a gene-ius *schmuck*, the valuable gene fragments of celebrities.” That’s one of the great things about language: like Billy Pilgrim, it becomes unstuck in translation, its meanings existing in simultaneous worlds. (See the anthropologist Paul Rabinow’s book *Making PCR: A Story of Biotechnology*, for an account of how PCR was invented, how it revolutionized molecular biology and genetics, and why Mullis qualifies as a genius *schmuck*.)

The next room begins your immersion in the cell and other life forms. Huge models of chromosomes and fruit flies tower around you. You don a pair of 3-D glasses



The German Geneticists' answer to Uncle Walt: CellWorld

(PCR). I can’t resist quoting the opening line of the catalogue copy on Mullis: “Heute geht Kary B. Mullis am kalifornischen Strand in La Jolla surfen oder verkauft pulverformiges Erbgut von Prominenten als GENialen Schmuck.” This is supposed to be translated as “Today Kary B. Mullis goes surfing from a California beach in La Jolla, or markets the valuable gene fragments of celeb-

— that wonderfully crude technology of the 1950s now unstuck into the 1990s – and enter a small theater to watch a movie of cell division, produced by the multinational chemical corporation Rhone-Poulenc. You’re wriggling around with the mitochondria as they move through the looming lace of the endoplasmic reticulum, sit stunned as spindles latch onto the dividing

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GeneWorld

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chromosomes in the air around you and pull them into the new “daughter” cells.

But this *Fantastic Voyage* into *Inner Space* (those semi-cheesy movies can tell us so much about who and where we are, and the inexorable dissolution of the science/fiction distinction) has only just begun. My favorite part of the exhibition was the passage from the cell room to the gene room. Viewers are forced to walk through a huge hypodermic needle, and are literally injected into the most interior world of genes and other cool molecules. An interior world which, through the wonders of technology,

unstuck in space.

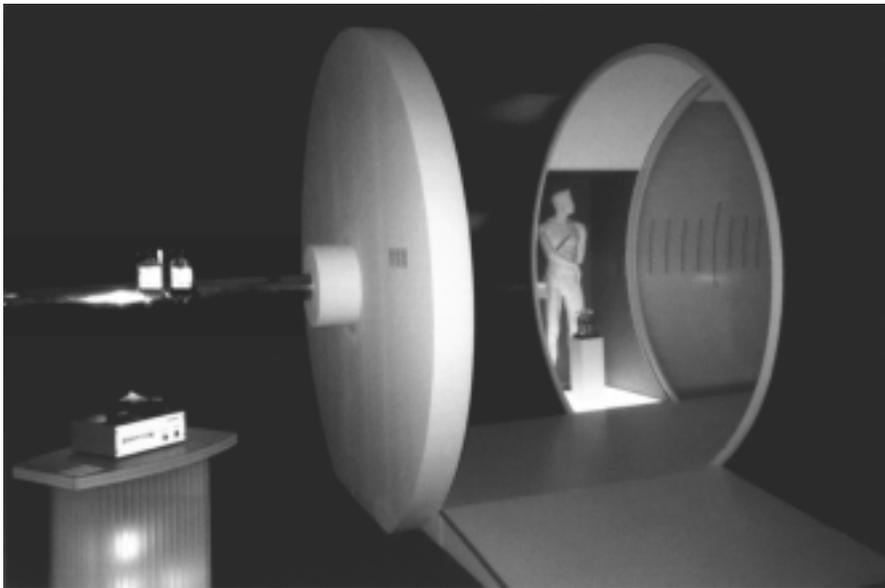
In reaction to this overwhelming immodesty, in which our organs and genes and molecular processes are subject to obsessive public display, viewing, and discussion, our habit (which we discipline and call “bioethics”) is to insist on such frail reeds as “privacy,” “autonomy,” and “choice.” We’re supposed to take some comfort in the worn and tired categories of the “human individual,” and trust that the bioethicists and the biolegalists will come up with the necessary management tools.

Good luck. The exhibition materialized the challenges posed by genes today. No, not by genes – genes are the little interior things that humans think they need to con-

and inhuman, whether it’s the ecoworld or the GeneWorld. We might wish it were otherwise, but there has to be some kind of response to the GeneWorld other than the enlightened-bioethical-management one. What would that be?

No one knows yet, but one opening response comes from the ArtWorld. The exhibition did a thorough job of detailing, in informative displays and text, the welter of ethical, social, and legal dilemmas that arise in the Gene World: employment discrimination, insurance denial, differential access to health care, and so on and so on. But the exhibition also went beyond this valuable informative role, into the even more unstuck and uncertain realm of the evocative, the aesthetic. Art is a great way to step just a little bit outside the “informational blueprint” paradigm that reigns not only in genetics, but in social science and in ethics as well.

There were some excellent pieces in the Dresden exhibition, but the final image here comes from the exhibition in Bonn, Gloria Friedmann’s “Mehrlinge (Mobilarama).” Appropriately enough, my German dictionary is insufficient and I can’t quite work out the translation of the title; you’ll have to make a mobile of words like mobile, mobility, multiplicity, excess, more, and more, and set this word-mobile in motion. The *präparierte Schweineköpfe* are sewn back-to-back — Janus-faced pig’s heads looking backwards and forwards, into the past and future, unstuck in time, stuck together with dangling tangles of *Elektronik-komponenten*. Swineborgs, suspended. No pig’s feet, let alone pig’s bodies; just pig heads. Pigheadedness. Stubborn habits. Suspended over a photo-



Time for your injection: viewers are reduced to microscopic scale

has been topologically inverted and is now on the outside, on display. It’s a powerful allegory for today’s life sciences: we’re surrounded – by “ourselves.” Enveloped by our “own” insides (which, of course, are owned by somebody else), hanging our guts out on the most public display, abetted by fantastic technosciences. We’ve become

control. This was the GeneWorld: it’s where we live, the space we inhabit. Genes aren’t us, but they *are* all around us. And the world, as any ecologist will be happy to tell you, is something that can’t be controlled – indeed, the human desire for control almost always leads to ecological disaster. Humans are just too stupid to control something so huge

graphic carpet of runners frozen in motion. Fierce competition, race to nowhere, Race, hygiene: stubborn pigheaded beastly habits. Yes, and now suspend those readings. Trained, disciplined marathoners, in it for the long haul. Not individual, not collective, but a pack, a crowd, a multiplicity in motion. Hoping for a good run in the face of enormous odds against them, still trying to plug productively into the animality which hangs over them, suspended. Unsettling suspense of GeneWorld.

So as the nature/culture distinction continues to undergo a difficult and “in-



The Swineborg Collective

exorable dissolution” – which is, fortunately and unfortunately, a complex and fast process that also involves the most hard and fast solidifications – we’ll need these kinds of ambiguous, open-ended objects and images to keep our thinking about GeneWorld from becoming stuck in either reflex opposition or mind-numbing enthusiasm. Exhibitions like those at the German museums, which juxtapose the informative with the evocative, the scientific with the cultural and historical, the inexorable with the aleatory, are a good means for all good techno-science pilgrims unstuck in time. And what’s time, but thought?



ISIS Seminars Probe the *Limits*

By Abby Drake and Scott Tundermann

After returning victorious from last fall’s seminar series, the *U.S.S.* (United Seminar Series) *ISIS* warped into a second, more defined series this spring. The destination? The land of Limits—Limits to Knowledge, to discovery, to opportunity. It’s a wild place out there beyond the edge, and pretty dark too, so muster your reconstructionist courage and grab your quantum flashlights.

Science, according to conventional belief, is a process by which the borders of our knowledge are increasingly pushed back, expanding the illuminated domain of science. This spring’s seminar series offered alternative takes on this convention, examining limits not as shadows to be illuminated nor as unfortunate

and temporary constraints, something to be pushed back, gotten over or transcended. In different ways, each of our speakers showed how engaging the question of limits has been, for all disciplines, a rigorous and creative process, and an unavoidable and generative part of the knowledge system itself.

A big part of *ISIS*’s mission is showing that it is essential to examine the internal and external limits of our thinking in order to continue to open avenues of investigation—avenues not thought possible or important before. Throughout the seminar series, these borders were pushed by investigations into a wide variety of intellectual pursuits by a diverse pool of thinkers. And just to stretch the Limits a little farther at the end, *ISIS* Executive Director Michael Fortun presented a distil-

lation and complication of the themes in the series.

The *U.S.S. ISIS*’s voyage to the Furthest Reaches began under the navigation of Dr. Charles Bennett, a physicist at IBM’s Watson Laboratory. In his talk “Complexity and Self-Organization,” Dr. Bennett ranged over topics from Mandelbrot’s fractal images to a short story by Jorge Luis Borges. He explored how our previous investigations of the complexity of systems were limited because we failed to consider the history of their development. One solution to this, he proposed, is the use of computer-inspired concepts such as complexity and depth to model the development of structural and historical complexity, including organic systems which live and die. With new ways to map

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Sailing the Seas of Reconstructive Science

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these processes, we can better understand them and explore new paths of inquiry into their behavior.

Dr. O. Tacheeni Scott, a Native American by birth and a microbiologist by training, proposed that the limits to our acquisition of knowledge resulted from excluding intuition from the objectivity of current scientific reasoning. The Native American tradition uses intuition as a common tool for gathering knowledge, he argued, but conventional scientific reasoning considers intuition to be “out-of-bounds,” an invalid means of conducting truly scientific investigations. Tacheeni posed that intuition is a part of science and knowledge-gathering that is often not recognized by Western scientists. When scientists deny that they rely on some form of intuition, they tend not to be honest or clear in their pursuits of knowledge.

Studying people whose business is transcending limits, science journalist Robert Buderer has been traveling across the country and around the world interviewing researchers at corporate labs. For his book, *Engines of Tomorrow*, he has been asking them how they come up with creative solutions to corporate problems. Perhaps not surprisingly, he has learned that the best corporate labs use innovation, not invention, as the source for new technologies. They surpass limits by revising and improving, not designing from scratch. He also gave examples of how corporate laboratories rely on social innovations, as at Xerox PARC in Palo Alto, where anthropologists and programmers collaborate on interdisciplinary teams.

Dr. Piet Hut, astrophysicist at the Institute for Advanced Study, addressed two themes: the limits of individual experience and the intrinsic logical limits to scientific knowledge. He suggested that individuals are inherently limited to only one view of the knowledge sphere, and hence our descriptions of the world are limited by personal experience. He also discussed the distinction between limits that show up in our models of the world versus limits that apply to the world itself, as we know it through observation and experimentation. Dr. Hut proposed that if a theory from one field of science (such as physics) encounters a point at which it can no longer go any further in its development, it may be useful to examine in greater detail the mathematics upon which it is based. Physics would also be helped, he said, by a deeper understanding of our personal experiences and how they influence our scientific theories.

But a storm was brewing during our mission of discovery, culminating in the tornado (metaphorical and literal) of deconstruction that was Dr. Michael Fortun’s response to the thoughtful calmness of the previous seminars. The aim of this tornado, Michael was quick to reassure us, was not to destroy or deconstruct all that had been presented but to reinterpret it—to show us the limits within our discussion of limits, to transport us away from the flat lands of our safe little world to the fracto-cubist facets of reconstructive thinking. Like tornados, all systems of knowledge – a Borges short story, sociobiology, *The Book of Job*, deconstruction itself – have holes in their middles, an internal-

ized limit which is exactly what makes them so awesome.

The tornado passed and deposited us back on earth—or Gaia, as Dr. Lynn Margulis calls the planet we occupy. She introduced us to her inquiries into endosymbiogenesis with an exciting discussion of sex, gender and organisms. Our limited scientific definitions explode when one day we take a closer look at a couple of little worms and discover that they have thousands of different possible genders, and that some can change their genders at will! We are limited, Margulis says, because we are anthropocentric and not thinking of the Earth as a whole organism that has a huge range of systems and parts and needs all of them to continue functioning. For example, when scientists were totally dumbfounded by a strange cloud floating in the sea off Northern Europe, they found to their surprise that it was composed of a bloom of tiny organisms that help to regulate our atmospheric gases. Such planetary self-regulating life makes our contribution as intelligent beings seem entirely... well, limited.

We began our Limits to Knowledge seminar adventure with computer worms destined to die in their endeavor to mimic the development of complexity, and ended with even smaller transgender worms showing us that they have much more interesting sex lives than we ever could. Rather than finding answers, we’ve been busy posing questions and challenging ideas. Such is the life of ISIS and reconstructive science: we’ve begun to chart a map, but have also discovered along the way that the land of science is changing right under our feet. 

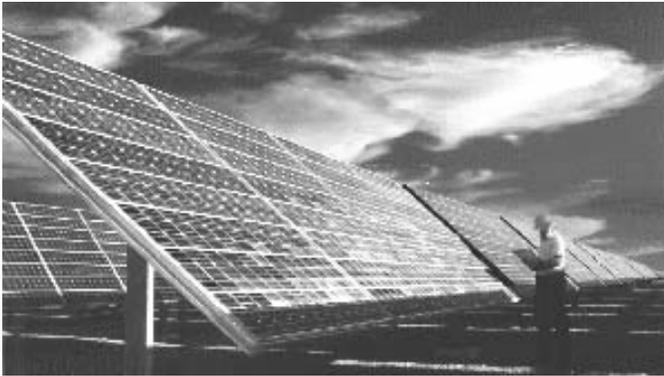
ISIS Fires Up Renewables Project

On March 25, 1998, ISIS took a step in an exciting new direction: the inception of a renewable energy project. The project has been under development around ISIS for some time, but the meeting on the 25th was its first public appearance. To seek collaborative input, we invited academics, businesspeople, citizens, and experts from other non-profits to gather for a luncheon discussion of renewable energy the ISIS way.

As ISIS Founding Fellow Mike Fortun explained to the group, and as many of you reading our newsletter know, the "ISIS way" means taking a critical look at how science is defined and used, and

to the "soft energy path" since the early 1970s. And many other groups offer consulting, technical research, political campaigning, public awareness events, and other resources.

But there's an angle on the problem that hasn't been addressed. None of these groups have addressed the questions one step back from the renewable energy market: why do people make the energy choices they make? What values and politics define their choices? How has the world of energy use developed, and why, and how does that define the present situation? Arguably, the above-mentioned



how culture and politics influence science. Lots of groups are working hard to address the shortfall of renewable energy use and the problems associated with conventional energy consumption (global warming, acid rain, dependence on foreign oil, hazardous nuclear waste, adverse health effects, and ecosystem destruction, to name a few). The Northeast Sustainable Energy Association organizes the Tour de Sol electric vehicle rally, the National Tour of Solar Homes, the Toward Tomorrow Festival, and numerous other public events and trade conferences. The Rocky Mountain Institute has been central

groups have bypassed all of this academic inquiry and are working on practical solutions. But their effectiveness has been limited, and ISIS sees an opportunity to critically examine the bigger picture and try to improve the way the problems get solved.

We've asked ourselves a series of our "really?" questions at the outset: is conventional energy consumption *really* a problem? Is individual decision-making *really* a determining factor? Do people's cultural and political values, and those applied to them by others, *really* affect their decisions? And can ISIS *really* do anything to address those values and politics? Essentially, since such questions are inevitably debatable, we've gone ahead without completely resolving them. Nevertheless, such questions help

keep the project grounded and self-reflective.

The meeting in March introduced our perspective and our questions to the renewable energy community: the business-people, activists, educators, students, scientists, and others who work day-to-day with the people who make energy choices. We hoped that such well-informed and thoughtful people could help us conceptualize the project and direct its first steps. Our panel of experts (a term defined very broadly at ISIS) included an author of a children's book about renewables, an advisor for a technical innovation program at Hampshire College, a builder who renovates apartment buildings (incorporating renewables when possible), a couple of solar equipment retailers and installers, students from the local colleges, a consultant who performs energy efficiency audits for homeowners, and so on.

In the short span of one afternoon, we briefly introduced ISIS and our ideas and then facilitated a discussion which touched on the impediments to renewable technology, the initiatives which have been successful in the past, and some ideas on how to make headway in the future. Though it was difficult to stay focused on the questions of values and politics and their impact on energy choice, ideas and insights flowed fast and furious. In some ways, the participants in our discussion were thinking about values and choices implicitly.

Dr. Marcus Raskin, a longtime ISIS associate and founder of the Institute for Policy Studies, has written extensively on the possibil-

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Toward a New Science for a New

For new readers, and for those who just like an occasional reminder of ISIS's overall vision, we've excerpted some materials from ISIS's next donor fundraising campaign, which was launched at a meeting in Palo Alto in May. Please contact us if you would like more information about becoming or helping someone else become a major donor.

Background

In October 1992, a group of scientists, academics, community organizers, and foundation executives assembled at the Yale Club in New York City to discuss the formation of a new, non-profit organization, the Institute for Science and Interdisciplinary Studies (ISIS). With their collective input, a roster of projects was set out, each addressing an urgent social problem that involved science: sustainable agriculture research and practices, the clean-up of the military's toxic legacy, sustainable technologies for the developing world, new literacies demanded by advances in human genetics, and others. As a direct result of that initial meeting, ISIS incorporated and raised over \$85,000 in start-up funds, including a \$50,000 grant from the John D. and Catherine T. MacArthur Foundation.

In the five years since, ISIS has grown to an organization with an annual budget of over \$200,000 and a history of successful projects that have worked at the intersection of scientific frontiers and community needs. In just a few years, our projects have achieved local, national, and even international recognition for their innovative and effective collaborations involving scientists, scholars of the sciences, and community members.

Now ISIS is convening new advisory groups on both the East and West Coasts to discuss the planning and finance of the next stage of its

growth. Our goal is to build on ISIS's achievements over its first five years, to sustain a multi-focused organization that will create new sciences, and new science literacies, for a new century. ISIS exemplifies how the most creative scientific inquiry, combined with attention to its historical and social context, can be put to work in demanding real-world situations.

Why ISIS Is Unique

There are organizations, like the Santa Fe Institute, which push at the frontiers and redefine the limits of how we think about the natural world. There are organizations, like the Keystone Center, which develop science and technology policy recommendations from their seminars and dialogues among concerned experts. And there are organizations, like the Rocky Mountain Institute and the Citizens' Clearinghouse on Hazardous Waste, which bring together technical experts with concerned citizens in cooperative, participatory projects aimed at particular social problems.

What makes ISIS unique and effective is its multi-track approach to the sciences. It is the only organization that we know of which combines *doing* path-breaking science, *analyzing* the sciences from historical, cultural, and policy perspectives, and *democratizing* the processes and products of science to better meet social needs.

ISIS helps citizens, students, and scientists alike integrate technical expertise with keen sensitivity to the force of culture, social needs, institutions, economics and politics. Recognizing the rapid pace of change in the world, ISIS works to build social projects and modes of scientific inquiry that recognize the need for tentative solutions always in need of re-evaluation. From the laboratory to the seminar room to the town meeting hall, ISIS encourages creative questioning as the means to envision new possibilities.

Century: An Overview of ISIS

The challenge is to build a “House of Experiment,” a space for collective invention and critical analysis like those built in 17th century England which ushered in the Scientific Revolution. The “House of Experiment” at ISIS, however, extends participation beyond “gentlemen scientists” to fully tap the resources of a pluralistic and democratic society. ISIS works on the premise that broad participation in an inquiry-driven scientific enterprise will make both better sciences, and a more humane and democratic world. The goal is to synergize culture and science, rather than leave them at highly politicized odds.

The Three Rings of ISIS

ISIS is organized into three programs, visualized as three interlocking rings to suggest how each program has a distinct focus, even as it links up with and contributes to the others. The three programs embody ISIS’s conviction that we need both conceptual innovation and social innovation. We need new concepts for thinking in the sciences and for thinking about the sciences as much as we need new social forms for bringing the sciences into the world. ISIS develops new kinds of *questioning literacies* – science “reading skills” that promote both wonder and curiosity, and a heightened critical capacity – as well as new kinds of *advocating technologies* – projects which bring together scientists and citizens into new working relationships.

The Program on Reconstructive Science undertakes original scientific research, fosters dialogue among scientists, and develops curricula for educating young scientists. A primary focus of the program is in Dr. Herbert Bernstein’s field of quantum interferometry and quantum information. Boosted by a 1997 grant from the Insti-

tute for Scientific Interchange in January and a three-year grant from the National Science Foundation, the program’s scientific research is nationally and internationally recognized as path-breaking. The arrival of Dr. Howard Barnum, the Institute’s Postdoctoral Fellow in our Quantum Computation project, is a gratifying and exciting new development.

The Program for the Study of Science and Culture sponsors original research on the sciences from the perspectives of the humanities and social sciences, and organizes conferences and public seminars. Science Studies Fellow Dr. Michael Fortun has presented his current research, which focuses on the science and business of human molecular genetics, at conferences in Cambridge, San Francisco, Dresden, and Berlin. Fortun and Bernstein have just finished their new book, *Muddling Through: Pursuing Science and Truths in the Twenty-first Century* (Counterpoint Press, November 1998).

The Program on Citizens, Science, and Democracy coordinates technical assistance initiatives which link different kinds of experts and their knowledges – lay and professional, social and scientific, community organizers and university researchers – to address social problems collaboratively. The *Military Nuclear and Toxic Waste Cleanup Project* brings together scientists, the military, and local citizens to address the complex problems of military toxics at a local, regional, and national level. The *Secoya Survival Project’s* focus on participatory research, whereby ISIS scientists incorporate their expertise with that of the indigenous groups they’re working with, leads to a very effective combination of modern technology and traditional knowledge for improving aquaculture and drinking water supplies in the Ecuadorian rainforest.

Renewables

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ity of “reconstructive knowledge” and the factors which make thought inherently political. Part of his argument is that there is a pervasive controlling force at work, active or systemic, to make people receptive, compliant, and passive — the media and present power structure serving together as a colonizing system. “The task of the Dream Colony is... ensuring that the structure of the Authoritarian relationship remains.” As applied to the renewable energy issue, this means that government, the conventional energy industry, and the media outlets all cooperate to help the public accept the status quo and their disempowered position. The electric company keeps us well-lit and runs our many conveniences; the oil companies provide for our mass-produced cars and omnipresent furnaces; and the army does what it takes to ensure that none of our supplies are ever threatened. We need not take responsibility for our energy needs nor the results of our

consumption. Indeed, we are quite isolated from the consequences of our choices and the causative relationship between use of resources and environmental effects. We don’t even have to consider alternatives, since the current system has all well in hand.

The March meeting corroborated many of these ideas. As Richard Gottlieb of Sunnyside Solar in Brattleboro, Vt. pointed out, people are interested not in the energy itself but in the services it provides: hot water, cold drinks, a mode of transport. Paul Schmidt, who performs residential energy audits with the Center for Ecological Technology, meets people every day who “just aren’t in touch with energy.” And Jim Mell, who installs solar energy systems, says people are more interested in their big-screen TV than in the photovoltaics that could power it for free. It seems that all

the groups advocating renewable energy alternatives may be wasting their time and effort if they can’t even get people to see that their energy use is a choice, conscious or otherwise.

One of ISIS’s fundamental goals is to help construct “the intellectual component of a social

revolution for the 21st Century” (MacArthur Foundation proposal). A central part of such a revolution is to empower and motivate individuals to escape the Dream Colony mentality. With the renewable energy project, we have the opportu-



nity to consciously design initiatives to directly further the mission of the Institute. If we can help people become conscientious and self-determining in their energy choices, not only will it vastly improve the state of the environment and human health; it will also be a step toward the kind of informed, active, critically-thinking society ISIS works to help create.

Possibilities for the project abound. The March meeting produced a number of ideas, and we at ISIS have continued to develop and explore our options. Thanks to a new Project Development position in the Institute, the renewable energy initiative is receiving substantive, regular attention. We’ve begun to identify near-term and longer-term objectives, and our next steps are to move forward with preliminary work while we seek funds for the rest of the project. We’d like to thank the attendees of the inception meeting for their insight, creativity, and assistance. Updates on our work will be forthcoming!



Q & A with the Secoya Survival Project

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by some members of the community who felt particularly unhappy with the agreement; some people had signed the agreement, some remained against it, so there was a kind of swing of the pendulum.

The second thing that happened was that they were unhappy with a number of specific events, and the overall experience of having oil company workers in the community. That had a very big impact, particularly in Secoya, the community where the work was actually based.

MF: So describe the scene.

JO: I arrived mid-day of the first day of the congress. I had to hire a canoe to get there, so they just dropped me off in the center of San Pablo – a community of about fifteen to twenty homes. I had my luggage, a box full of food, and these plastic water tanks that we were going to install, so it took me about three trips up the river bank from where the canoes moored. There were a lot of canoes, so I knew the meeting had started.

I walked up to the schoolhouse where they meet, and the first thing I noticed that was different was that the people who came out to greet me were wearing these printed name tags, with plastic covers and the metal clip to attach them to their shirts – an oddly formal kind of thing. Most of the people had manila folders, and a few people were sitting outside at desks, taking notes. The schoolhouse was full, and I could hear someone talking over a loudspeaker. They were in the process of choosing the *Mesa Directiva*, the head table, the people who would run the congress.

MF: When you say it's full, how many people are there?

JO: At any one time there's probably close to a hundred people in the schoolhouse. There's always more people hanging around outside listening, people come and go. But among the people elected to run the congress were two Commissioners of Discipline, who were supposed to watch the doors; officially, people were only supposed to leave for five minutes to do their business and come right back. And the commissioners got annoyed that they didn't. They also elected a president, a vice-president, and two secretaries.

MF: All men?

JO: No, the first secretary was a woman, and one of the disciplinarians was a woman. There were two doors; the women tend to sit at the back of the schoolroom, so the woman disciplinarian was at the back door.

MF: Any kids?

JO: Kids come and go. The youngest participants in the congress were in their early twenties, and even at that age they tend to be fairly quiet. The majority of the talking throughout the congress was done by ten to fifteen men, and two or three

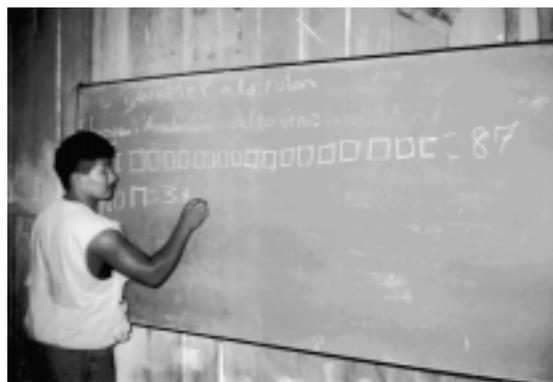
women – most from their mid-twenties to their forties. They tend to dominate because of their personality, their level of education, and how well they speak Spanish – not that that was used during the meetings, but because it gives them power in the outside world.

I was talking to Bill Vickers, an anthropologist who works there, about the election process. He said that back in the 1970s, someone told him that the headmen are selected over time, based on what they contribute to the community. It was typically a shaman, so it included their ability to bring game, but also their care or concern for people in the community. It wasn't an office that one sought. Bill was specifically told that a Siona shaman up in the Cuyabeno had wanted to be headman, but that that was considered gauche.

So on the one hand, you've got these ten or twelve people who clearly dominate the congress, and even within that there are people like Elias, who came here to Amherst, who are clearly community leaders. And there was a lot going on that I thought of as maneuvering to demonstrate leadership prior to the elections, but then when the elections actually happened, there was absolutely no politicking. People couldn't nominate themselves, and I don't think they even voted for themselves. I noticed that a lot of people voted for their opponent.

MF: Where did they learn these procedures?

JO: Probably some from the missionaries; the Summer In-



Counting the votes to annul Occidental's contract to explore Secoya territory

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stitute of Linguistics was there for a long time. And Elias and his brother Celestino in particular were their primary students, and they became the new generation's headman, replacing the last Secoya shaman, who was their uncle. And the Ecuadorian political system was another source.

In one part of the congress, they broke up into working groups; one group dealt with the relationship to Occidental. But they realized, when they were coming back to report, there was much too much to really act on, so all decisions related to Occidental were postponed until the end of May. So they'll be having another three-day congress, specifically focused on Occidental.

MF: Not knowing how that's going to come out, can you say something about what the issues are?

JO: Let me give some of the history. Occidental has this concession, a block of land about two thirds the size of Rhode Island. The Ecuadorian government claims subsurface rights to oil and minerals, and then contracts with outside companies to produce that oil. The deal is fifty-fifty: the government owns it, the oil company produces it, and the profits are split. There has been a whole series of nationalizations and then denationalizations of the oil business by Ecuador. Right now we're in a period of rapid expansion of concessions that's been going on for a number of years, virtually covering the entire Oriente region. And Occidental's concession happens to overlie most, but not all, of the Secoya-Siona territory along the Aguarico river. Along the north portion of Secoya territory, there's land that hasn't yet been conceded

to any company, but could be in the future.

Occidental began talking to the Secoya in 1996. There were a series of negotiations, but the Secoya said they didn't want the company to come in. Then they negotiated more and eventually signed an agreement, which was then denounced by the Secoya, and then another agreement was signed. The problem with the original agreement was that the Secoya thought they were negotiating just for seismic exploration, and just for a small area around San Pablo, in the western, more developed end of their territory. But the agreement they ended up signing didn't have any of those stipulations on limits. It was also signed by a Siona leader but the Siona came back and denounced it, saying that they didn't agree with what their leader had negotiated. The Secoya didn't denounce it so quickly or so strongly, but they did eventually renegotiate another agreement.

MF: What's the legal structure by which Occidental has to negotiate with the Secoya, even though it has this concession from the government of Ecuador?

JO: It's fairly vague and confusing. Occidental is required to compensate for damages; they're required to provide information about what they're doing; and they're required to get permission to come in and do their work. On the other hand, there are laws which say the Secoya or other groups are not allowed to create obstacles, not allowed to block production. So almost by definition it's going to be a confusing and unclear process, because at what point are you being an obstacle, versus just demanding your rightful compensation or information? If you say you can't come in until we know

more of what's going on, is that blocking the company or an exercise of rights? And that's not even raising the issue of all the international agreements to which Ecuador is a signatory.

From the company's point of view, they can say: we cut seismic lines, we go through someone's property, we damage so much coffee or whatever. That works a little more straightforwardly with colonists, because individual families own the land, it's largely "productive" land – in other words, it's already been damaged – and it has a fairly easily defined economic value, because they are raising coffee, or palms for palm oil, or crops for their own consumption. It gets more complicated when they start having oil spills that damage the colonists' health, or kill the cattle or make the land unproductive over the long term, but in theory, if you're doing your production properly and just doing whatever damage it takes to put a road or seismic lines through, you can make a calculation.

With the Secoya, you're talking about communal land. A lot of it is anywhere from old growth, to fallow lands that are going back to second growth, to shared resources of various kinds. It's a lot harder to figure out an economic value for it, or the kinds of impacts created. The Secoya are much more dependent on wild game, for example, than the colonists are. What is the impact of noise on game, and how far out does that go? The company doesn't consider that at all; they simply pay per meter of seismic line. Occidental had come in August 1997, did their seismic testing, and left. People were expressing a lot of concern when I was there in December, expecting Occidental to come back,

and a lot of people didn't want that. There were some very strong feelings that this was going to destroy the land and the community.

So we were concerned and wanted to do more. We provided information from Occidental's annual report, just so the Secoya would know more about who they were dealing with: what the company is, how much money it moves, where else they work. And people



Secoya men during a discussion about the Occidental oil company's proposal for exploration of the region for oil.

were very interested, because they had been told by representatives of Occidental that they couldn't afford to put in wells, which were among the original things the Secoya had asked for. Instead, Occidental offered those things like wheelbarrows. And when the Secoya saw what Occidental had spent on seismic testing, and what the president of the company earns, and things like that, they quickly realized that they had not been negotiating in good faith. They started saying things like, well, if they earn so much per day, we'll take from 9 till noon, and they can have the other 21 hours. So I think that information was useful to them.

In February of this year, the Oc-

cidental representatives did show up, announced positive results from their seismic tests, and that they wanted to put in some exploratory wells. From Occidental's point of view, that fell under the terms of the current agreement that had been signed last year. And the Secoya were not all that happy about that, because drilling wells is a very different thing from seismic lines.

Lori Barg and I found documents

that had been provided by other organizations within the Secoya community – documents that talked about their rights, more information about Occidental. So we basically got that from within the

community and gave it back in the meeting, creating some new handouts: if you decide to negotiate, here are some basic negotiating processes, rules for how negotiations work, a bit of strategizing. We presented that in the meeting after they had already taken their vote to annul the agreement.

At first the oil company said, you can't annul the agreement. But then they're pretty much stuck with the fact that, whether they could or couldn't, the Secoya did.

MF: So that's the good part of the vagueness of the legal structure.

JO: Yeah. Basically, the oil company takes the position – and it'll be interesting to see if they stick with it – that they will not do any-

thing the community does not want. Historically, there have been examples of U.S. oil companies pulling out when they're told they can't work in some place. That won't necessarily solve the situation with the Secoya. Some people feel the Secoya ought to negotiate with Occidental, because if they don't negotiate with Occidental and Occidental leaves, a less benign, non-U.S. or non-multinational oil company will come in. In particular, people mentioned the oil companies run by ex-generals of the Ecuadorian army. Those companies are much smaller, with fewer funds to do community projects, without shareholders who might pressure the company, and so on. And that's a real possibility and a real fear.

We've been there largely as observers to this process, since we first started going down in 1997 to help with aquaculture and drinking water. Other than providing some information on the oil company, and having private conversations on the topic just to learn more about the community, we haven't been involved, until March of this year. Then Occidental asked Ted Macdonald, of Cultural Survival and Harvard's Center for International Affairs, to come in as an observer to the negotiation process. The Secoya have since accepted that, and added Bill Vickers and me, but I wanted that to be changed to "ISIS" being observers. So that's part of our role now.

Up until we were asked to be an observer, it was unclear what ISIS's role ought to be in all of this. Now they clearly want our advice and participation. They named us as observers, but my understanding is that they're looking to us for advice, whereas Ted's definition of

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being an observer is as a neutral position. On the other hand, he seems to spend more time with Occidental, and gives them advice directly. He also is much less involved in any one situation; he's very busy with the case of the Uwa in Colombia, and elsewhere.

Ted's relationship to the Secoya goes back to the 1970s, when Vickers was working there, and Cultural Survival got involved to support the Secoya in their attempt to delimit their territory. Orville Johnson, one of the missionaries there, made a claim for the Secoya territory more or less on his own. Some Secoya leaders were upset, saying he had done this without discussing it with them; basically, it was just a small area around San Pablo. It fit with Johnson's agricultural perspective: the Secoya families would be like colonists' families, and they'd have cattle and so on. The Secoya didn't like that at all, and rejected it. There was a bit of a clash. So Bill Vickers and Ted Macdonald, together with some agencies in the Ecuadorian government that were friendly to the indigenous people, worked to get them a much larger claim, that over a number of years was gradually approved and expanded. So Ted and Cultural Survival had a major role there.

It's really Ted that's arguing – and it is a strong argument – that oil production is inevitable, and that Occidental is going to give them the best deal they can get. If you don't have Occidental you're going to have Maxis, and if you don't have Maxis you'll have something worse. *MF: Was Maxis particularly bad?* *JO: Maxis was bad. They're gone*

now. They took over from Conoco, which was the company that the NRDC tried to broker an agreement with, on behalf of the Huaorani. Compared to any other deal that's ever been negotiated on behalf of or by indigenous people, concerning oil development in Ecuador, it was far and away the best deal. Everything from protections along the roadways, keeping out colonists, to investment of large sums of money with the Huaorani. Now it was only on paper, so who knows how many changes would have been made or how well it would have worked. The Huaorani denounced the agreement because at that point they were unwilling to negotiate for anything: they didn't want oil companies in, period. And they resented the NRDC and Ted Macdonald acting in their name, without consulting them. So they, with a lot of support from Ecuadorian environmentalists, trashed that agreement; Conoco pulled out; Maxis took over the concession, and ended up going in, and the Huaorani got much, much, less.

And that is the example that Ted always holds up. It's true: it was the best agreement that's been negotiated. Of course, they were dealing with the most isolated indigenous group in the Oriente, and they were trying to do in a matter of months something that really required years. Even if you believe that oil production has to go forward and will go forward, and this deal was the best deal, it was not done in a way that was culturally appropriate. Which is why it got dumped.

And what I see him missing in his brief visit, is that he doesn't spend any time on whether or not the Secoya need technical help so they can have a say in how the company does their drilling, and so on. Because basically the company is

considered the experts in this, and your best bet is to get the best company you can, and trust them to be environmentally sound. So there's no talk about having any ongoing oversight at that end. It's just: try to get the best development projects, and maybe give them some advice on cultural relations – don't put your workers in the community, have them come in and out every day, and so on. So the focus is limited to cultural impact, and some kind of development to pay for the damages. I find it very limited, and I find it a bit paternalistic. There need to be more options on the table, and more meaningful options: is it an option for the Secoya to refuse entry altogether? Is it possible to have indigenous people involved in overseeing the exploration and production processes as they go forward? What kinds of technical assistance would they need? I see our role as helping the Secoya raise some of these issues and broaden their discussions with Occidental.

In their vote in March, the Secoya said they were voting to annul the agreement, but that they weren't going to vote right then on whether or not they would negotiate further with the company. I see what they're doing, their discussions with the company, as still pre-negotiating. And I think that they've got that fork down the road, but from my point of view, that's a choice that's going to remain with them for quite some time. They could even start negotiating, but they can always cut it off at any point, and would probably be best off if they negotiate in bite size pieces. What Occidental wants is one agreement, and to be done with it; that's clear.

But from the Secoya point of view, I think the best deal would be

to say: OK, you want to come into a territory to do a topographical survey. If they accept that at all, they should just accept that and nothing else, because the company keeps claiming "well, we can't give you the information you want until you let us do these things." So if that's the way it is, then let them do the minimum they need to do in order to get the information the Secoya need to be able to evaluate the next step

they want to take. And I think it's easier because the Secoya are in this position of lacking knowledge about what actually could take place, particularly the people in the community who don't face outward as much, who can't read the Spanish documents, who can't understand the legalese, or things like that. They really need to evaluate and decide based on their experiences with the company.

ISIS thanks those who have given generously since December 1997 (donors over \$100 are in bold):

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Update

In a special meeting May 27-29, OISE voted to allow Occidental access to their territory to do a topographical survey. One Secoya condition was the receipt of the Environmental Impact Statement prepared by Oxy, which was turned over to OISE on June 5. OISE also made the innovative condition that the oil company pay damages on a per-plant basis, with prices set by the Secoya based on their spiritual and practical value. Oxy agreed to pay the wages of a 14 person Secoya team to oversee the surveying and calculate damages.

OISE plans to use the two months Oxy is surveying to develop a community development plan as a basis for future relations with the company. The Secoya feel their big decision still lies ahead: whether or not to let Oxy drill exploratory wells in their territory.

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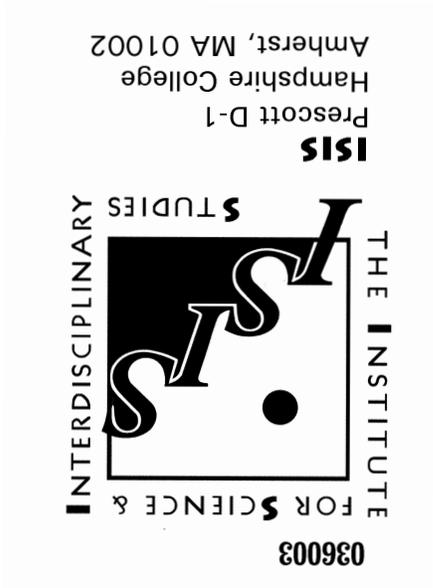
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