Promethean Science, Pandora's Jug and Areal Studies: Globalization Makes Strange Bedfellows

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See for example:
Weiss, Charles and Thomas Eisner, 1998. "Partnerships for value-added through bioprospecting" *Technology In Society* Vol. 20, pp 481-498. The objections of the United States to the treaty on germ warfare lie in part in fear that property rights of biotech firms will be compromised. As in all international negotiations, the United States takes stronger stance on private property rights than other nations. The American representative officially stated that "confidential business information" would be at risk under the treaty [*New York Times,* July 26, 2001, A7]. See Ronald J. Herring, "Authority and Scale in Political Ecology: Some Cautions on Localism," in Louise Buck et al, eds, **Biological Diversity: Balancing Interests Through Adaptive Collaborative Management** (Boca Raton: CRC Press, 2000) pp l87-205.åâœ These variables account for the marked difference between the United States and Britain in acceptance of GMOs as food. Americans consume vast quantities of GMOs every day, and would be hard pressed to avoid doing so; Europeans resist. On the empirics of trust in government and science, see Sarah Plotkin, "A Nation Up in Arms vs. A Nation Shrouded in Silence: Great Britain vs. the United States on Genetically Modified Organisms," Cornell University, April 2000; also, Vera Kettnaker, l999. "The European Conflict over Genetically-Engineered Crops, 1995-97" Prepared for delivery at *Transnational Networks and European Contention* Cornell University, Einaudi Center for International Studies, Institute for European Studies (February, 5-6) . See Horsch, Robert B. and Robert T. Fraley, 1998. "Biotechnology Can Help Reduce the Loss of Biodiversity" *Protection of Global Biodiversity: Converging Strategies.* Lakshman D. Guruswamy and Jeffrey A. McNeely, ed. Durham: Duke University Press, pp. 49-65. For the "doubly green revolution" stance, Gordon Conway, 2000, "Crop Biotechnology: Benefits, Risks, and Ownership." Paper delivered to the conference **GM Food Safety: Facts, Uncertainties, and Assessment**. Edinburgh, Scotland. March 28. The successful candidate will be expected to actively engage with external stakeholders in the process of conducting research; for example, the dissemination of findings and assistance to institutions to integrate the public interest into their decision processes might be fulfilled in the normal course of conducting collaborative research, or the successful candidate might create an appropriate outreach program.

CONFERENCE DRAFT [NOT A FINISHED PRODUCT]

Area Studies and Ghettoes: The premise of the organizers of this conference is that area matters. That is, special efforts should be made to organize activities on an axis that privileges geographical space. There are inherent risks to this strategy, shown clearly by practice in the United States. But all of us who identify with South Asian studies recognize the powerful sociological and sometimes intellectual advantages of an area-based organization of intellectual life. The great challenge underscored by globalization is to avoid essentializing and reifying area – as if these "areas" were divinely constructed (when in fact they are more likely to have been constructed by the US Department of State) – while not devaluing grounded contextual knowledge.

Reifying area runs risks. In the United States, our first problem has always been to escape marginalized ghettoes of area specialists. South Asia had an especially difficult burden: our region was not only of little importance in a very parochial academic culture, but India was in particular in bad odor in the United States during the cold war. Indological studies continued, but most universities did not do it systematically or seriously. There are around 15 universities in the United States that can make some serious claim to mounting an area-studies program in South Asia of any real breadth or reach, including languages, social sciences and humanities. Of these, somewhat fewer than a dozen are traditionally funded with federal monies from the Department of Education in competitive peer-reviewed rounds of application. Places like Japan and China, and even the Soviet Union, fared much better. South Asia was not a popular place. To give but one telling example, there are exactly as many seats on the Program Committee for the Association for Asian Studies for "South Asia" as there are for "Korea."

This disadvantage was deepened by international political economy. East Asian actors sought legitimacy and contacts in American universities, resulting in significant largesse for studies of those regions. Both wealthy individuals and foundations/corporations rooted in East Asia sustained scholarship in these areas,

resulting in endowed professorships, research programs, academic exchanges and the like. South Asia has until very recently experienced almost none of this patronage.

Within this marginalization, my own *jat* is especially disadvantaged: few universities would advertise for a specialist in South Asian politics. Increasingly, in the United States, "area studies" has become a pejorative in political science praxis. First came the attack of "science" as modified appropriately by "social," indicating the difference between spheres of science. Social science, in its efforts to be more like a real science, is deeply ambivalent about area studies. The search for regularities in discoverable laws of behavior seeks central tendencies, not infinite regresses into particularities. Globalization likewise challenges area studies: if phenomena are driven by powerful global forces, ought scholars not be focused on dynamics of convergence/resistance and relations across space rather than frozen sections of a map?

This fairly bleak picture has become fortunately complicated in recent years. The intellectual landscape of South Asian Studies has changed by dint of the sheer quality of participants from the region. As South Asian scholars come to prominence or dominance in some fields intellectually, our percentage of faculty who have some interest and expertise in South Asia grows apace. No one asked what area Pranab Bardhan, T.N. Srinivasan, Kaushik Basu or Amartya Sen inhabited on the area studies map; universities sought them for their expertise. This advantage results directly from the colonial legacy of English education and ties to England, where the undergraduate experience continues to produce extraordinarily gifted academics. The contrast to Southeast Asia is clear: indigenous scholarship has not reached the stage of global visibility obvious in South Asian Studies, and English is the reason. The fly in this particular ointment is that the high salaries and support infrastructure of American universities deprive South Asia (and Britain) of many of their best academics. Though the problem is far more severe in Africa, there remains an international ethical dilemma for building South Asian studies outside the region: to what extent is our success built on exploitation of international inequalities?

The clear implication of the statement above is that collaborative work must replace the individualistic “lone-wolf” model many of us learned in graduate school. The great challenge of area studies intellectually is that there is more on the table than most individuals can manage. We seek interdisciplinarity, yet disciplines in themselves are quite demanding. Collaborative teams work around this paralyzing sense of the area scholar that she needs to incorporate the normative model in her person: mastery of history, language, culture, politics, the arts, and so on.

Economists were the first to abandon the view that areal knowledge in its bewildering complexity matters. Markets are markets. This development gives a hint of things to come, as economics lives at the margins of science in much the same sense as Jean-Paul Sartre said that ideology lives at the margins of knowledge. As other social sciences seek to emulate economics, the prospect of training areally grounded social scientists recedes accordingly. Yet, paradoxically, it is in science that many of our best prospects for genuine collaboration come.

In many ways, the area studies battle in the United States is a battle for the social sciences – and in some ways only for Political Science (which remains, however, the largest student major on many campuses, including Cornell). That is, Economics has abandoned areal studies, often to great disadvantage in terms of relevance and accuracy, as has Sociology for the most part. History remains about areas, as it has always been: there are few generic historians, but rather historians of Germany or Japan. Anthropology remains area-friendly, since the exotic is the core of its *raison d’etre*. Yet even in Anthropology there are disputes about the relative value of ethnography – and language training in train – relative to what passes for theory (often verbal gymnastics with little claim to theory as classically formulated). As in the Brahmanical world, theory often triumphs; *shudras* do the field work. Geography as a discipline has lost a lot of ground, having disappeared from a number of major American universities. It is only in political science that the debate remains sufficiently balanced as to leave the results uncertain. Here the debate is between the Nomothetes and the Areoles.

The Fragmentation Dynamic -- Not in My District: The academic universe has among its many fractures that between the Nomothetes and the Areoles. The Nomothetes despise ideographic names in favor of variables; *Swatantra* becomes political party, *Narmada Bachao Andolan* becomes social movement. Areoles celebrate their knowledge of place names, the more obscure the script, the more the diacritical markings in translation, the better. In the world of Nomothetes, place and time are not very important. Nomothetes believe in covering laws, or at least middle range generalization, which can be confirmed by empirical observation. They fear above all the Areoles' commitments, which seem to risk an infinite regress into particularity. If the world is as complicated as the Areoles maintain (and celebrate), the prospects for scientific progress in a Kuhnian sense diminish.

In the world of Areoles, specificity of place and time present the very real danger of an infinite regress into particularity. Consider the Association for Asian Studies. Asia is not a meaningful object of study, but rather a convenience, and an imagined object of administrators and mass publics. Indologists grouse constantly that the association is dominated by China and Japan. There is no question in anyone's mind that these are separate objects of study, fields of inquiry. There is also little question in the minds of participants that they have little to offer one another. Any slot for a Japan panel is a slot lost for an India panel, and *vice versa*.

The problem is that the regress in infinite: South Asia is also not a region in any real sense. Panels on Sri Lanka are not a priority for those who study India. So within the Association for Asian Studies, once the move to the sociologically meaningful **South** Asia is admitted, there are smaller groupings of scholars: Rajasthan Studies, for example. At some point the fragmentation of knowledge runs to "not in my district," or even "not in my village." If difference is literally infinitely specifiable, not just the generalization desired by Nomothetes evaporates, but communication altogether. The tower of Babel is institutionalized by our areal practice. This reality is such a severe obstacle to advancing knowledge that James Scott as President of the Association, got money from the Ford Foundation to promote special panels on "Border Crossing" – an incentive to initiate comparative

panels. Response was disappointing. One of the great costs of area studies is that it often produces scholars so inward looking that they do not notice comparative possibilities, nor do they have much to say to other areas.

This is why the Nomothetes have such trouble with the Areoles. It is quite inefficient to ask comparative questions in a region of infinite regresses to particularities. Yet the search for master narratives that characterizes Nomothetic praxis is itself a leap of faith, distrusted by all those who prize precisely those differences that certify them as areal scholars. Yet the Social Science Nomothetes stand on shaky ground. Their theories are fairly flabby, or mundane, or tautological -- really more approaches and hunches than theories. The findings seem to critics invariably either controverted as they are found or inconclusive if uncontroverted. My modest proposal in this piece is to leapfrog the battle as it stands in favor of alliance with the real Nomothetes, the scientists. Not only does this move circumvent a pointless conflict, but also moves the prospects for collaboration forward: since science tends to be organized around puzzles on the one hand and public goods on the other, the specification of general problematics in the realm of areal studies constitutes an arena of great potential. As the organizers ask:

"*How can we ensure that the sciences and education will be concerned with the big material and social issues facing South Asian as well as other societies and also work towards alleviating and solving important social and material problems*?"

Embedded in this question seems to me a call for relevance of study. Operationally, among the most effective practice has been development studies: the social correlates of economic change. This is an agenda which I will argue offers much to development of area studies, specifically for South Asia because of the great depth in general (Nomothetic) development studies literature in South Asia and in development practitioners from the area. To put it simply, few conferences on any aspect of development will be absent a South Asian perspective. At a minimum, participants will refer to scholars and literatures from the region. That hopeful reality does not do much for Sanskrit, but it does point a

way forward.

Case Study: The Biological Revolution and the University -- Ethical, Legal and Social Implications of Genomics

Of the many examples one could use to illustrate this theme, the one closest to my experience is one spawned by the genomics revolution. This revolution is important not only for the profound ethical questions it raises, but also for its developmental challenge. Biotechnology is a sector in which low-income countries could conceivably have great comparative advantage. The biodiversity is there, not in the richer countries. Activity in this sector is relatively clean, and labor intensive, the precise opposite of treading the disastrous path of the currently rich polluters of common sinks and resources with capital intensive technologies. Development of biotechnology as a sector potentially recognizes the value of local knowledge, which is everywhere in danger of extinction.[2]

For this potential to be realized, however, three things must happen. First, quite serious concerns of safety and risk must be settled, implying the creation of international capacity, disaggregated to regional levels, to enforce the Biosafety Protocol of the Convention on Biological Diversity. This will in turn require human capital with grounded expertise in the social, agricultural, ecological and cultural systems of specific regions. Here the great insight of area studies is powerfully evident: variability in all these parameters will affect risk analysis, and specification will require both grounded and local knowledge. The status quo is clearly unacceptable: testing in areas of low biodiversity (such as Iowa) and release into systems of high biodiversity, where the mix of wild relatives is wider and the gene-flow problems more severe. In sum, realization of potential will require a double revolution in the legitimacy of science and government in mass publics: neither is much trusted in the subcontinent.[3]

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2 See for example Weiss, Charles and Thomas Eisner, 1998. "Partnerships for value-added through bioprospecting" *Technology In Society* Vol. 20, pp 481-498.

3 These variables account for the marked difference between the United States and Britain in acceptance of GMOs as food. Americans consume vast quantities of GMOs every day, and

Second, there will need to be fundamental reformulations of the property regime. Indeed, a novel property regime will need to be created from the ground up. Intellectual property rights intervene between science and application to determine the distributive and social consequences of technical change. Getting the property system wrong will lower the probability of biotechnology being justifiable in developmental terms – i.e., improving the life chances of the poor. The poor are very much a part of the legitimation practices of global firms seeking access to low-income countries (having lost the battle in Europe, at least for the time). Yet research and development under private control have no incentive to work on outcomes with low profits. If this property system drives development, the developmental promise of applied genomics will be attenuated.

There is currently a three-cornered contest for what the international property regime should look like: fee-simple ownership, national ownership as envisioned under the Convention on Biological Diversity, and the United Nations' model of biota being the "common heritage of mankind" – i.e., a common property regime in which pool resources are publically maintained with open access to all. Elements of all three property systems are at work in the contemporary globalization of biotechnology.[4]The CBD also mandates benefit sharing with local communities; figuring our the modalities and consequences of this institutional imperative is a daunting task that requires grounded knowledge of property

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would be hard pressed to avoid doing so; Europeans resist. On the empirics of trust in government and science, see Sarah Plotkin, "A Nation Up in Arms vs. A Nation Shrouded in Silence: Great Britain vs. the United States on Genetically Modified Organisms," Cornell University, April 2000; also, Vera Kettnaker, l999. "The European Conflict over Genetically-Engineered Crops, 1995-97" Prepared for delivery at *Transnational Networks and European Contention* Cornell University, Einaudi Center for International Studies, Institute for European Studies (February, 5-6) .

4 The objections of the United States to the treaty on germ warfare lie in part in fear that property rights of biotech firms will be compromised. As in all international negotiations, the United States takes stronger stance on private property rights than other nations. The American representative officially stated that "confidential business information" would be at risk under the treaty [*New York Times*, July 26, 2001, A7].

systems and practices in connection with the dynamics of development in particular places.[5] Though celebrating the local has become something of a *mantra* in development studies of late, there are severe normative and practical difficulties in building systems of action and policy around decentralization and devolution.[6]

Third, social direction will have to replace profit motive as the driving force of research. Current research has produced little of benefit to the poor. Indeed, consumers generally have not benefitted from the dominant developments in GMO agriculture, where efforts have been concentrated on selling more chemicals and lowering farmer costs per unit. The needs of commercial farmers have been paramount, as this is where the profits are. This is not in dispute. Research priorities will not automatically incorporate the needs of the poor. For example, poor farmers need research on drought-resistant varieties as the political economy of water often pushes them to the margins of water access, for example; poor consumers need nutrient supplements because their poverty prevents adequate nutrition in the market place. These priorities can be addressed only if there is good knowledge of the distribution of poverty over time and space, across seasons and economic cycles, across social differentiations of gender and class. Knowledge on nutritional practices and preferences needs both more precise specification and disaggregation. The yawning gap between what we know and need to know indicates the direction for collaborative efforts, and these efforts will require genuinely interdisciplinary teams and scholars.

These issues have exercised the development-studies community at Cornell University and some hopeful beginnings of a model are emerging. In April of l999, the Einaudi Center at Cornell [www.einaudi.cornell.edu] convened a conference entitled *Owning Nature*, under the auspices of the Provost. The subtitle of the event described our intent to signal a new set of issues in the biological revolution we

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5 See e.g, Anil Gupta, 1998. "Rewarding Local Communities for Conserving Biodiversity: The Case of the Honey Bee." ***Protection of Global Biodiversity: Converging Strategies***. Lakshman D. Guruswamy and Jeffrey A. McNeely, ed. Durham: Duke University Press, pp.180-189.

6 See Ronald J. Herring, "Authority and Scale in Political Ecology: Some Cautions on Localism," in Louise Buck et al, eds, **Biological Diversity: Balancing Interests Through Adaptive Collaborative Management** (Boca Raton: CRC Press, 2000) pp l87-205.

often group under the heading of genomics: “biotechnology, biodiversity and bioassets.” Though much of the conference discourse was about microbiology, we prominently included a panel on ethical, political and social issues. The section on “bioprospecting” [and its twin, “biopiracy”] explicitly included case studies of the United States as well as less industrialized countries. Indeed, the most egregious case of contemporary biopiracy was not South to North, but North to North, and the national park system – and people – of the United States were the victims.[7] We organized another panel on bioeconomics and biobusiness: new technologies enable business ventures and property claims unimaginable a generation ago, raising profound questions of valuation in both the economic and ethical sense.[8] Our premise was that genomics drives a new set of social concerns, from the ethical to the economic, political and legal. It is this social framework that will determine the effects of technical change on real human beings. A number of the scientists present thought this expansive view was a good idea but at the same time were not eager to get involved in that tangled set of issues. It was difficult to see how we could bring these ideas to some institutional form.

Cornell has now officially recognized the importance of these questions institutionally. The formal institution that resulted is the Ethical, Legal and Social Issues Thrust Area of the Cornell Genomics Initiative. Fortunately, the acronym is more user-friendly – ELSI. The work of ELSI is less than a year old, but there have been some interesting developments. The most important result is that ELSI recognizes that universities are not merely sites of research and discourse, but are important actors in the evolving order enabled by genomics. Cornell patents biological discoveries and inventions every year, in common with her sister research universities. What are the ethical, social and legal implications of

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7 Varley, John D. and Preston T. Scott, 1998. “ Conservation of Microbal Diversity a Yellowstone Priority” *American Society for Microbiology News* Vol. 64, No. 3, pp147-151.

8 For example, Reid, Walter V. 1996. “Gene co-ops and the biotrade: translating genetic resource rights into sustainable development.” *Journal of Ethno-pharmacology*. (51) pp.75-92; Tanksley, Steven D. and Susan R. McCouch, 1997. “Seed Banks and Molecular Maps: Unlocking Genetic Potential from the Wild” *Science* Vol. 277 (August 22) pp 1063-1066. Simpson, R. David, Roger A. Sedjo and John W. Reid, 1996. “Valuing Biodiversity for Use in Pharmaceutical Research” *Journal of Political Economy* Vol. 104, No. 1, pp163-185 for a skeptical view of the economics of bioprospecting.

university action in the real world?

In its first year, ELSI has been active in formalizing a strategic plan, in bringing speakers to campus for the Genomics Colloquium and in sponsoring two conferences, including the very exciting inaugural **Genomic Futures**: **Ethical Challenges, Social Choices and the University**" in October of 2000. [see http://www.genomics.cornell.edu/]. Grants for graduate students carrying on interdisciplinary research have been awarded by a sub-committee. There has been progress on the fronts of establishing media fora in New York City and obtaining grant money from the Department of Education. But the major work is to translate issues identified in the strategic plan of ELSI into faculty positions. Interdisciplinarity is on firmest ground when institutionalized as a faculty line. There is still some discussion of precise wording, which in academic communities never ends, but the first three positions will have the rough parameters given below:

Biotechnology and Global Development:

The successful candidate's work may focus on any relevant topics related to biotechnology and international development (e.g. intellectual property rights, distribution of costs and benefits, relationships with wealth and poverty, decision making and politics), with some preference for work dealing with agricultural biotechnology.

Ethics, Public Life, and the New Biology:

A position in bioethics, with a special focus on the ethical implications of genome research and the resulting new biology for public life. The successful candidate will contribute through research and teaching to interdisciplinary work on ethical, legal and social issues (ELSI) in research on microbial, plant and mammalian genomics being done at Cornell and elsewhere. Areas of interest could include general concerns about genetic research and genetic intervention, concerns about the methods and uses of genetic testing in humans, uses and abuses of explanations in terms of genetic endowment, concerns about the morality of marketing techniques and treatments emerging from genome research, concerns about justice in intervention or lack of intervention, concerns about reproductive freedom, and concerns about genetic diversity in all species.

Public Dimensions of Genomics:

The successful candidate will be expected to develop a program of scholarly work on the public dimensions of genomics, especially focusing on mechanisms for defining and integrating the public interest into on-going decision processes related to genomics research and/or its applications. It is expected that this work will make important theoretical contributions, as in methods for creating context-relevant definitions of the public interest, and will include the design, application and evaluation of methods for incorporating the public interest into decision processes. This might include, for example, experimentation with innovative models for direct public participation. The successful candidate will be expected to actively engage with external stakeholders in the process of conducting research; for example, the dissemination of findings and assistance to institutions to integrate the public interest into their decision processes might be fulfilled in the normal course of conducting collaborative research, or the successful candidate might create an appropriate outreach program.

In all cases, the committee expects that faculty hired to these positions interact directly with biologists and play an active part in the interdisciplinary Cornell Genomics Initiative.

There are five other potential faculty position definitions under consideration:

Biological Ideas and Cultural Change
Commercialization, Intellectual Property, and the University
History and Philosophy of Biology
Human Identity, Diversity, and Difference
Regulatory Policy and Genomic Technology

In the best of worlds, these eight lines will be filled with scholars of genuine interdisciplinary reach working on problems that travel internationally. The social consequences of the issues delineated by these positions are profound. In the words of the strategic plan of ELSI: “The biological revolution has only just begun, and as the rate of change accelerates, social and ethical issues will appear at an increasing pace. New issues will arise from many directions, sometimes in ways that cannot be anticipated, and they will often generate intense controversy. These

problems will be intellectually challenging, theoretically interesting, practically important, and publicly visible."

The implications for area studies are clear, and I think archetypal. For all these positions, the area of study is unspecified; one seeks the best scholar, not confined to a small pool inherent in hiring-to-area. Building capacity in research in specific regions, and comparative and collaborative work across regions, then follows from an initiative rooted in the impetus of science. Science then serves area studies as a source of new puzzles, new configurations of areal knowledge, and a new set of challenges. In the specific case of South Asia, science also appears not as a neutral method of adjudicating evidence but as a political arena. That is, biotechnology comes not as mode of inquiry and applied knowledge relevant to basic needs, but as a locus of politics contesting questions of nation, international power relations, meanings of development, biopiracy, ecological risk and a host of complications surprising to self-identified scientists.

Promethean Science, Pandora's Jug : In the normal use of the phrase, Promethean science implies that science is itself neutral, like fire, and can -- like fire -- be used for good or evil.[9] Prometheus had the job of allocating useful traits to all the animals; when he got to humans, all the good qualities (excellent sight, defensive weapons like claws, etc) had been allotted. Fire was left, and it had the power to subdue the other animals. In granting fire to humans, there was recognition that it would confer great powers and comforts to the species, but also great risks to themselves and others. Conservation problematics around the ethics of species mastery were born in fire. Zeus punished Prometheus for this hubris by chaining him to a mountain where a vulture consumed his liver until his rescue by Hercules (at least in the version of Aeschylus).

Within the realm of Promethean science, few issues arouse the level of globalized fervor of genetically modified organisms (GMOs) and biotechnology more

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9 The phrase in this context comes from Ismail Serageldin and G.J. Persley, 2000, *Promethean Science: Agricultural Biotechnolgy, the Environment, and the Poor*. Consultative Group on International Agricultural Research. Washington, D.C.

generally. The implicit argument is that we are dealing not with Promethean promise and risk but with Pandora's jug, with correspondingly darker connotations. Pandora was in Greek mythology the first woman on earth, given by Zeus to Epimethus, brother of Prometheus. Pandora came with a jug -- or box in some versions of the tale -- which was not to be opened. When it was, all evils that afflict the human race escaped; only hope was left behind in the jug. Pandora's very name means "all gifts; her jug came to symbolize what Microsoft calls "unexpected errors" -- that is unanticipated consequences of a normal human trait (curiosity). An outcome of the conflict in Troy is traditionally said to be that one should "beware of Greeks bearing gifts." Though there is the countervailing American adage that one should "not look a gift horse in the mouth," gifts have from the time of Troy and the story of Prometheus have carried a certain undercurrent of caution.

The global debate on genetic engineering largely falls into the cleavages introduced by Prometheus and Pandora. A great wall has emerged between camps that believe the biological revolution is more like fire – a source of currently unimaginable human progress which nevertheless is risky if used unwisely – and those who believe it is more like Pandora's jug -- set to unleash unknown, perhaps unthinkable, evils on the species if allowed to escape its confines in laboratories.

Within South Asia, India has made the most systematic efforts to cope with the biological revolution and its globalizing pressures. Under consideration in India now are domestic measures to implement India's obligations as a signatory to several international treaties. First, the Agreement on Trade-Related Aspects of Intellectual Property Rights of the World Trade Organization requires that India amend its patent law regarding intellectual property. Patents on novel organisms fall under this rubric. Obligations under the Convention on Biological Diversity (CBD) necessitate changes in the national system for dealing with real property as it intersects with biodiversity and habitats; the response is the Biological Diversity Bill. The response to TRIPS is both the Protection of Plant Varieties and Farmers' Rights Bill and the Patents (Second Amendment) Bill.[10] The political divides on these issues are deep.

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10 For a useful outline of the issues and the implications for property systems, see Philip Culled, "Biodiversity Legislation Reflects India's Obligations," *The Hindu* 22 February 2001.

India is poised between the European and American views of Promethean science. The optimistic side of the argument -- more evident in the United States than in Europe -- deploys poverty as a major theme for legitimation, tied to a neo-Malthusian logic premised on increasing food scarcities in the aggregate. The views of biotechnology as a means of ending poverty, as adopted by firms such as Monsanto, resonate domestically with the Nehruvian faith in modernization and science. In a very organicist fashion via this logic, modernization overwhelms poverty, which is a residue of backwardness. There is an underlying discourse of Malthusian logic: population pressures require a step up to more productive and adaptable technologies if progress on poverty is to made. The clearest global

representation of this argument is the Rockefeller Foundation -- which supports biotechnology along with traditional techniques (green manuring, biological pest control, etc) as a means of feeding the global poor -- who have cyclically emerged and disappeared as an object of policy -- over the next decades. The "doubly green revolution" replaces the seed-fertilizer technologies of the l960s and is required by continuous expansion of the mouths to be fed.[11] The recent meeting of the Indian Science Council, in similar vein, discussed biotechnology under the conference theme of “Food, Nutrition and Environmental Security,” a set of associations abhorrent to the NGOs which protested the event.

Visions of food security and nutritional improvement from genetic engineering resonate with earlier policy debates in Indian agriculture. The "green revolution" as political symbol crystalized this cleavage on both dimensions: Malthusian assumptions and a benign view of science and technology as saviors. Its critics pointed to class-skewed rates of adoption and inequality of outcomes, whereas scholars such as Michael Lipton looked at aggregate effects and argued that poverty would have worsened in the absence of massive production increases: food prices are always higher under conditions of scarcity than under conditions of plenty.[12] Poverty was at the core of disputes over technology and strategy. To deal with the poor, political parties adopted either a land-redistributive stance (on the left) or moved to subsidize agriculture with nominal targeting for the poor (the dominant response). Neither worked very well nationally for the simple reason that a coalition for the poor is hard to mobilize; public programs confront local power which can either veto or coopt.

In terms of conventional poverty analysis, bioengineering and technology represent a frontier where the usual modes of analysis do not apply smoothly. Yet there is deep resonance with questions of property rights and the role of the state. These traditional questions are complicated by the presence of an international system pressuring the final dismantling of the nationalist economic project of Nehru. It is because India has become a party to international agreements that controversial changes in domestic law are required. Linking protests against globalization -- which is held to be self-evidently anti-poor -- to the biology of crops grown and consumed by the poor has been an important political move among NGOs.

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11 The most comprehensive statement is by Rockefeller’s President, Gordon Conway, 1997. ***The Doubly Green Revolution: Food for All in the 21st Century***. New York: Penguin Books.

12 Lipton, Michael with Longhurst, Richard, 1989. ***New Seeds and Poor People***. Baltimore: Johns Hopkins University Press.

Nationalism has been deployed alongside themes of environmental risk and cultural challenge: a new call for *swaraj* in agriculture. Yet proponents of biotechnology argue that the poor are their constituency -- that the existing array of technologies and dynamics in unequal agrarian systems are hardly pro-poor; that the "traditional" seeds romanticized by critics of biotechnology are inadequate in terms of yield and adaptability to existing farm-level constraints, and that biotechnology allows in principle addressing the specific needs of the poor (who are often left with access to marginal land and inadequate water). For example, a plant that is engineered to be drought resistant and to tolerate poor soil may be tailor-made for the poor farmer.

Whatever the political stance, clearly property rights are fundamental to real outcomes. The "green revolution" favored those with deep pockets and access to the state, particularly to subsidized, often *de facto* free, farm credit. Property rights condition the effects of new technical change on the poor, on several dimensions. First, what will biotechnologies cost? Their cost is a function of property rights of developers of new strains. No one thinks Monsanto is in the charity business. On a global scale, the war[13] between property rights and the needs of the poor escalates with the incorporation of development costs and profits into the price of seeds – indeed the opportunity cost of capital is deployed by multinationals as a cost.

There are two interesting new developments that give pause to the easy assumption that globalization is conceptually coherent. First is market segmentation. Partly in response to political pressures opposing GMOs, multinational firms seek profits in countries with rich farmers but provide the technology free or at cost to poor nations. The much disputed “golden rice” -- the poster grain of the biotechnology movement -- falls into this category. Its promises of alleviating the Vitamin A deficiency that kills millions yearly, and leaves hundreds of thousands more blinded, would be transparently ridiculous if all development costs and patent rights had to be covered in the cost of the seed. Second, there is the path-breaking South African AIDS-drug resolution, in which property-rights claims of multinationals were attenuated to compensate for the poverty-level of nations needing the drugs. Secondly, as political practice has focused on biopiracy, the global property regime has begun to be specified in terms that have real consequences. Who owns the genetic material that forms the components of biotechnology as process and outcome? The Rio treaty (CBD) says the state owns biota; the poor throughout India, particularly in *adivasi* areas, contest Delhi's claim to ownership of nature and terrain. The Rio treat enjoins governments to find ways

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13 Not to be melodramatic, war is the metaphor of Kristin Dawkins’ **Gene Wars** (op cit).

to establish "benefit sharing" so that the poor can profit from the biodiversity which they have preserved through the absence of "development." What are the politics of moving toward that intriguing possibility? The new *panchayati raj* institutions in India offer both new prospects and a hint of severe problems to come.

There is implied in the above an empirical question and a political question. Empirically, it is not well understood how biotechnologies will affect the poor in India. For example, pesticide-producing crops such as Bt cotton, which have flourished in China, reduce applications of market-purchased pesticides, presumably favoring poorer farmers, but reduce demand for labor in application, presumably harming wage laborers. Those same laborers then gain some health advantage -- avoiding pesticides -- but lose daily wages. Second, the yield advantages of GE crops are not to date dramatic; the effect on consumer prices and farmer income may not be large, though it is precisely these effects that are centered in the firms' presentation of their technologies as saviors of the poor. Third, we do not know what mix of private and public ownership of the technology will result, and this question affects costs of production for all farmers. The empirical ambiguities are huge; though both sides in this debate present their case as rooted in clear evidence, the evidence is in fact mostly absent.

To some extent, this debate itself replicates the venerable question of who speaks for the poor, and on what basis. Yet the issues are different in at least one important way: the poor know very well what variable distributions of land and credit and wages mean for their well-being. There are long-standing struggles on these issues. Biotechnology inhabits a murky area of the politics of expertise: much that needs to be known is either not known or known to very few. For this reason, I expect the politics of poverty around genomics to exhibit some novel characteristics. How will political parties interpret their interests in this contested mix of messy empirics? Where will environmental and other NGOs position themselves, and why? What is interesting in these questions is a sense of anticipatory political strategy: how do political actors determine what resonates with both the mass public and with the poor?

Conclusion: The conference organizers asked:

What can the globalisation of economic, cultural and political spheres mean to the sciences and education, especially in a global society where people simultaneously continue to be separated and divided by ecological, economic, cultural and

political gaps as well as by contradictions and conflicts?

This paper has argued that global public goods in biotechnology and development manifest this dilemma of globalization and separation. That is, the globalizing process of biological advances is clearly built on contributions of the sort the United Nations used to call "the common heritage of mankind" -- a complex web of knowledge stretching backwards in time and across continents in space. In this model of knowledge, it is virtually impossible to carve out value-added property rights conceptually. Likewise, given this historical reality and the tendency for ecological systems to ignore administrative conceits of humans, specifically **national** property claims are difficult to sustain. It is the spatial differentiation of expertise that divides the globe on issues at the biological frontier. Who can assess risk? Risk to whom? Who will decide?

Simultaneously, realization of those public goods posited by Prometheans has some implications for the way we can sustain and strengthen area studies as academic communities. Multiple public goods are at stake in the development of biotechnology; information and capacity are fundamentally asymmetric in distribution. The consequences for poverty, human health, nutrition, ecological balance and sustainable agriculture are both species-wide and profound. The list of remarkable medical and agricultural advances is large and growing -- indeed, one of the puzzles in the GMO debate is that GMO pharmaceuticals, such as insulin, have been accepted with virtually no controversy, but agricultural organisms have provoked violent reactions. Natural systems have historically provided living laboratories, counter-intuitive insights and raw materials for innovations. Yet just as advances in biotechnology increase the payoffs of discoveries from wild biota, declining biodiversity threatens depletion. There is then a pressing question of the appropriate balance of public interest and distributed rights in these resources. There is tremendous momentum built up in the biotechnology business; the driving mechanism is typically private profitability of firms with considerable clout. It is important to investigate alternative courses of action before arrangements become hardened, possibly in ways that have adverse long-term consequences for public welfare, for the advance of independent scientific inquiry, and for maintenance of

ecosystem diversity and stability.[14]A global system of property is growing up around us; understanding it requires attention to both global processes and local responses.

Finally, the organizers ask:

How can we avoid contributing to information monopolies in the hands of Western elites and trans-national companies engaged in knowledge and science-based production or in multi-media production?

There are few spheres that match genetic engineering in terms of the inherent *angst* that motivates this question. Scientific knowledge is a classic global public good. Access to this public good is powerfully skewed. To some extent, science has become an object of conflict, rather than an arena for adjudicating truth claims. But there are fundamental divides as well.[15] These divisions are politicized and stand in the way of breaking information asymmetries. To take the India case: if the Vandana Shiva camp wins out over that of MS Swaminathan, India will be a marginal player in a game in which it could be a leader. "Western elites" hold knowledge monopolies that will be reinforced to the extent that Pandora's Jug dominates discourse in the South.

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14 See Horsch, Robert B. and Robert T. Fraley, 1998. "Biotechnology Can Help Reduce the Loss of Biodiversity" *Protection of Global Biodiversity: Converging Strategies.* Lakshman D. Guruswamy and Jeffrey A. McNeely, ed. Durham: Duke University Press, pp. 49-65. For the "doubly green revolution" stance, Gordon Conway, 2000, "Crop Biotechnology: Benefits, Risks, and Ownership." Paper delivered to the conference **GM Food Safety: Facts, Uncertainties, and Assessment**. Edinburgh, Scotland. March 28.

15 The literature is exploding. For a useful framework, see John Dryzek, 1997. ***_The Politics of the Earth***. New York: Oxford University Press. For an extreme view of risk and danger, see Kristin Dawkins, 1997. ***Gene Wars: The Politics Of Biotechnology***. Seven Stories Press (Open Media Pamphlet Series). Specifically on ethical dilemmas, see Leissinger, K.M., 2000, "Ethical Challenges of Agricultural Biotechnology for Developing Countries," in G.J. Persley and M.M. Lantin, eds., ***Agricultural Biotechnology and the Poor***. Consultative Group on International Agricultural Research. Washington, D.C.

First, there is the divide between those who see genetic engineering as “playing god” and those who see it as a continuation of a process of human manipulation of “nature” that has been going on for at least 10,000 years.[16] In the great natural war between trees and grasses, humans have intervened on the side of the grasses, creating things we now consider quite natural -- wheats, maizes, rices, millets – and destroying their competitors the trees by giving grasses privileged places to grow (fields). Genetic engineering allows this process to proceed more rapidly and more precisely. The species, if it has been playing god historically, is now potentially a more efficient god. The cultural and political divides on this question are more chasms than *nullas*.

The second fundamental divide is that in the former view -- that we are playing god -- the risk to nature and humans is grave, though unknown; we simply do not know what is in Pandora’s jug. On the other side, among the Prometheans, the totemization of risk is held to be utterly inappropriate: there is no progress without risk, indeed no life without risk. Everyone knows that flying on airplanes, driving a car, having a vaccination, breathing air in cities -- all these activities entail risk; most of us accept risks in everyday life for the benefits obtainable thereby, some do not. I came to this conference on an airplane; my mother will not fly. The problem with genetic engineering to date is that we are dealing with uncertainty, not risk: the probabilities are not known. Moreover, there is no individual-level choice about environmental risk. In the absence of labeling, even informed choice about risk is difficult to obtain for those who fear ingestion of GMOs. Indeed, in the United States, GMOs have so permeated our food system that it is virtually impossible to avoid them. Given how much is unknown, rational calculation of risk and benefit is less possible; politics is dominated by interests, on the one hand, and by fear or hope -- the bottom of Pandora’s jug -- on the other.

Finally, there are divergent views of the natural: what we might call an organismic

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16 The most provocative recent statement of this process and its impact on societal evolution is Jared Diamond’s **Guns, Germs and Steel: The Fates of Human Societies**. New York. Norton.1997.

view and a molecularist view. For the organismic view, putting a fish gene into a tomato -- the most common of the examples used by opponents of engineering -- violates some threshold of the unnatural. Some geneticists think crossing kingdom boundaries is more risky than closer crosses, others think not. For the pure molecularist, there really are no fish genes and tomato genes, just variable organizations of amino acids: all life is composed of the same stuff, just differently arranged. For the organismist, species constitute the natural world; to disturb this order is to assume the thoroughly unnatural role of god.

These divergent world-views are not reducible to the deductive logic of the Nomothetes; they are rooted in cosmologies and ethics that Areoles seek to understand. If global public goods in the sphere of biotechnology are to be realized, it will be through understandings that take local specification seriously but do not miss the underlying political economy and biology of the sector which are independent of place. In order to enable this outcome, universities need to foster the capacity to understand societies in holistic but differentiated terms. Yet in doing so, they will also have to foster the norm that lone wolves often starve: collaborations are the key to interdisciplinary success, difficult though they are to organize and sustain.