

When the public heard of it, you got this fear of illegitimate sex, of mixing things that didn't ordinarily mix up. Upon reflection, this was very silly. I think DNA moves around a lot. It doesn't always do good or bad, but it is going to happen.

The whole thing is that you just don't know. But we don't live in a risk-free society.

I'm drawing up the Whole Risk Catalog. Under D I have dogs, doctors, dioxin—where do I put DNA? Very low.

We have had enormous attention paid to people having evaded the guidelines. We should be careful at the penalties we impose on people who cheat at tiddliwinks.

This is nonsense, this whole hearing is nonsense. There are lots of things that scare the shit out of me, like Tris, but recombinant DNA, no!

This is supposed to be a great dialogue between scientists and the public. I can't think of a worse subject, because there is nothing to discuss.

The question now is, what is the best way to get out of this political mess.

Science is good for society. We are being attacked by everyone who doesn't have the guts to go ahead.

The dangers of this thing are so slight—you might as well worry about being licked by a dog.

The upshot of last month's meeting was to give NIH a reasonably coherent message, to the general effect that the science behind the proposed revisions is fine but the regulatory aspects need more work. Fredrickson agrees that Hutt "has some legitimate criticisms," and concedes that NIH is not expert in regulatory matters. But, he adds, recombinant DNA is not like a routine FDA problem: "We are not regulating Campbell's soup."

The NIH director believes the agency has the responsibility to propagate standards for gene-splicing research but he is

unhappy about enforcing them as well. He would like to see some other agency, such as the Center for Disease Control, assume that task. "I think it is a conflict of interest for the NIH to be both the sponsor, conductor and regulator of this kind of research," he told the meeting. "My own belief is that it would be to the maximum advantage of the country for a very simple legislative package to be passed extending the existing guidelines to everyone."

Fredrickson's decision on whether to adopt the proposed revisions is formally independent of whatever action Congress may take during the next session. Last sessions' attempts to frame legislation failed to reach the floor of either the House or Senate, but Congress has not yet lost interest in the issue.

—NICHOLAS WADE.

## Peat for Fuel: Development Pushed by Big Corporate Farm in Carolina

Interest in development of peat deposits as an energy resource has, until the last year or two, been concentrated in the Midwest (*Science*, 12 December 1975), where the peat bogs are much more extensive than those found in most other parts of the United States. But a new center of initiative is now rapidly emerging in eastern North Carolina—peat development there would complement an extraordinarily ambitious private undertaking to convert large tracts of swampy, brushy terrain to productive farmland.

This land reclamation effort was begun in 1974 by First Colony Farms (*Science*, 25 July 1975), which embraces 372,000 acres on a low-lying peninsula just to the west of the famed North Carolina outer banks. From the beginning, the First Colony project has been bedeviled by the 5- to 6-foot mantle of "woody" peat that covers about half the farm. The big stumps, tree trunks, and limbs found throughout the soil profile—preserved there for thousands of years by the peat's acidity—can wreck farm machinery and make cultivation of row crops impossible. But since 1975 First Colony has been developing plans to turn the peat to its advantage by mining it as fuel,

either to be burned directly for generation of electricity or converted to synthetic gas.

Although all the talk at First Colony of erecting 600-megawatt power stations or big synthetic gas facilities may turn out to be pie in the sky, the plans for peat development are being pursued in deadly earnest. According to Simon B. Rich, Jr., president of First Colony (which is owned by Malcolm P. McLean, the wealthy entrepreneur who launched the successful "sea-land" service for moving truck trailers by ship), about \$1 million has been spent or committed for purchase or rental of peat "harvesting" or mining machinery from Finland and the Soviet Union, for contract studies, and for staffing and otherwise carrying on the farm's peat development experiment.

The harvesting equipment has already been delivered and assembled. It consists of some 17 machines for land preparation, "milling" the peat (or breaking it into loose particles for drying by the sun), and then gathering it from the fields. This equipment will be used during the coming spring and summer to determine whether enough peat can be mined during the warmer, drier months to permit power-generating or synthetic

gas-producing plants to operate year-round.

A study by the Research Triangle Institute puts the farm's recoverable reserves of peat at more than 400 million tons. This is believed to be enough to fuel four 400-megawatt power plants for 40 years or an 80-million-cubic-foot-per-day gasification plant for nearly 50 years. The heating value of First Colony peat is 5200 Btu's per pound at 50 percent moisture, or almost 40 percent of that of bituminous coal. Environmentally, it offers the advantage of being low in sulfur and ash content and of posing no difficult problems of land reclamation—indeed, once the mantle of woody peat is removed, the land can be put into corn and soybeans.

The Bechtel Power Corporation has been commissioned by First Colony to determine the cost of producing power from peat. Moreover, the North Carolina Electric Membership Corporation (NCEMC), made up of 28 utility co-operatives, has contracted for an engineering study looking to construction at the farm of a 150-megawatt unit by 1982.

Among the unresolved questions facing the First Colony peat development project are two that are of particularly pressing concern. For one, the farm's peat is much more woody than that which the Finns and Russians have been harvesting, so there is a very real question whether the Finnish and Soviet equipment will prove capable of efficiently separating the peat from the logs and other woody material. If it does not, First Colony will have to give up the idea of using the "milled peat" method of

harvesting the peat, and go to something quite different. One possibility being considered would be to excavate the peat with a dragline, shake and screen out the woody material, then slurry it for transport by pipeline to the generating plant where it would have to be dewatered with a mechanical press before combustion.

The other question is whether First Colony can keep the U.S. Air Force from proceeding with its plans to acquire by condemnation a 45,000-acre bombing range which it now operates under a lease from the farm which expires in 1979. Rich says that about 144 million tons, or 31 percent, of the First Colony peat reserves are within or near the bombing range and could never be harvested so long as the range remains in operation.

Governor James B. Hunt, Jr., of North Carolina and Senator Jesse Helms (D-N.C.) are asking the Air Force to try to arrive at some accommodation with First Colony, at least to the extent of allowing the farm more time to test the feasibility of its plans for peat development. But up to this point the Air Force has been unyielding, apparently in

the belief that to find a satisfactory alternate site along the East Coast for a bombing range might be impossible.

Notwithstanding these problems and uncertainties, the First Colony peat development project represents to date the biggest effort actually to demonstrate, in the field, methods for mining and using U.S. peat deposits as an energy resource. In the Midwest, work on peat development has taken a different course, for the principal effort there has been the one mounted by the Minnesota Gas Company (Minnegasco) to determine whether peat from the big bogs in northern Minnesota lends itself to gasification.

In 1976, Minnegasco, with financial help from the U.S. Energy Research and Development Administration, had the Institute of Gas Technology (IGT) in Chicago begin a 2-year gasification experiment carried out at laboratory and process-development scale. Highly encouraged by the results, IGT is now proposing that its existing "Hygas" pilot plant for the gasification of coal be used for a pilot-scale experiment with peat. This would be a preliminary step toward a demonstration in the mid-1980's of a commercial plant producing daily 80 mil-

lion cubic feet of gas of pipeline quality.

At the same time these developments are going on in North Carolina and the Midwest with respect to the mining and use of peat as a fuel, some important reassessments of the size of U.S. peat resources are being made. In the past, the domestic peat resource, excluding the peat in Alaska, has been estimated at about 14 billion tons, with about half of it in Minnesota. But R. S. Farnham of the University of Minnesota has come up with an estimate of 58.6 billion tons for the "lower 48" states and another 61.7 billion tons for Alaska, equivalent to 240 billion barrels of oil altogether.

Farnham is quick to add that, given various economic and environmental constraints, only a fraction of the total resource—and perhaps a modest fraction—would be recoverable. Nevertheless, his estimates, derived from a U.S. Soil Conservation Service inventory in 1967, suggest that whereas peat heretofore has been considered no more than a locally or regionally significant energy resource, it may now deserve to be regarded as a resource of considerable significance nationally.

—LUTHER J. CARTER

## Radicals and the Universities: "Critical Mass" at U. Mass.

American radicals have never really found a niche in the universities. By the test of tenure, colleges and universities have been reluctant to give full faculty status to those who espouse basic changes in the political and economic system. This exclusion has applied not only to Marxists but to radicals in the homegrown populist tradition. In recent years, however, a small but significant number of academic radicals have gained tenure, even in economics and other social science departments which, historically, have been farthest off limits to scholars holding heterodox views.

The current distribution pattern is a scattered one with radicals found one or two to a department and a few to a university, at least in the tenured ranks. A notable exception is the University of Massachusetts at Amherst, where the arrival of a cluster of radical economists 4 years ago led to creation of a "critical mass" of radicals.

Today, the economics department has ten faculty members who, although their views are by no means uniform, would call themselves Marxists. They do not constitute a majority in the 25-member department, but do form the largest and most visible group of radicals currently in academe. Events over the past few years at U. Mass. have demonstrated the difficulties of implanting a radical group in a conventional economics department, but have also witnessed radicals taking hold in a situation which almost certainly would have been untenable for them a decade ago.

This colonization at U. Mass. was made possible by the coincidence of a tenure fight at Harvard and a time of troubles for the University of Massachusetts' economics department. The pivotal figure among the radicals was Samuel Bowles, who was junior member of the Harvard economics department between 1966 and 1973. Bowles is the son of

Chester Bowles, an ambassador to India in the 1960's. Sam Bowles in the early 1970's had solid credentials as a mathematical economist and a reputation as a radical. The Harvard economics department had a record of never granting tenure to a radical, which, incidentally, still holds.

In the 1972-73 academic year, with the up-or-out decision on tenure approaching, Bowles had taken a year off from Harvard and was in Amherst, at the Labor Center at the university. While there he came to the attention of the U. Mass. administration as a prospect for hiring.

The U. Mass. economics department was in turmoil at the time. Massachusetts, like other Northeastern states, had moved late to expand public higher education, and the Amherst campus in the 1960's went through a major cycle of growth. The economics department was recognized as a glaringly weak spot, and in the later 1960's the administration set out to remake it. The initial effort resulted in the hiring of a phalanx of mathematical economists. This triggered protests that the department lacked other specialties needed for a balanced program. By 1972 the department was so deeply divided that the university provost appointed the dean of social and behavioral sciences, Dean Alfange, as act-