The Lone Prairie

In the middle of the nation's largest physics laboratory primeval Illinois grassland is being restored

Photos: Fermilab

By DIETRICK E. THOMSEN

The grass is taller than standing people. Down in the midst of it, it is easy to imagine Native Americans creeping up on a stag, the difficulties of getting pioneer wagons across this kind of landscape or the terror provoked by a prairie fire. Yet, at the moment, as Thomas Warkins puts it, "it is peaceful here." It is peaceful even when we look up and see the 16-story administration building of the Fermi National Accelerator Laboratory sticking incongruously above the Indian grass.

This piece of reconstituted tall-grass prairie is located inside the main ring of the Fermilab accelerator. Warkins, a graduate student at the University of Wisconsin finishing up a summer job in Fermilab's prairie restoration project, likes to emphasize the contrast between this natural historical restoration project and the latest in high technology that surrounds it. Indeed, there is something of an irony, albeit a splendidly fitting one, that this laboratory devoted to the most reductionist of sciences should harbor in its center such an experiment in complex interrelationships, the antithesis of the reductionism involved in the study of isolated protons and mesons and neutrinos, and not quite so isolated quarks. The contrast is refreshing and for some people recreational.

The primeval prairie of Illinois, the so-called Prairie State, virtually disappeared under the plow during the period of European settlement. According to a note by Mark Thompson in the March 1981 FERMILAB PRAIRIE PROJECT NEWSLETTER, "Today only seven acres in ten thousand are left undisturbed in Illinios, and the beauty of the prairie is all but forgotten." Settlers considered the native prairie plants weeds. Today Warkins and other prairie restoration enthusiasts refer to the Eurasian species introduced by the settlers as weeds. In this business a weed is any plant that doesn't fit your plans. One man's weed is another man's pasture.

Prairie restorations began in the 1930s, Warkins says, but a large increase in interest came with the surge of ecological and environmental consciousness that began in the 1960s. The Fermilab tract, at 617 acres slightly less than a square mile, is the largest such restoration yet attempted, according to Warkins. Its size gives ecological scientists many advantages for the study of the interactions of plant and animal species in such an ecosystem that smaller tracts of an acre or two do not offer.

Esthetics and history are not the only motivation for prairie restorers. Ecologists wish to know how the native ecosystem developed and how it interacts with the atmosphere and geology of the location. There is now interest in turning unused lands back to a more native kind of landscape. Warkins says that some industrial companies, concerned about the mounting cost of maintaining manicured lawns and trimmed shrubbery, are thinking of turning their open yards into prairie, which would need only minimal maintenance. The Illinois Highway Department is having similar thoughts about the margins and median strips of its roads.

The Fermilab tract has another large advantage as a prairie restoration ground. It is surrounded by a moat, which carries cooling water for the synchrotron's magnets. It is thus particularly convenient to burn over the tract from time to time. Fires are necessary for the vigorous growth of the proper prairie species and the suppression of weeds. In a paper on the management of the prairie, Warkins points out that "by burning [late in the spring] the weedy exotic species are severely hampered, enabling the fireloving indigenous species to take a strong foothold." Originally prairie fires came from spontaneous combustion of fallen vegetable matter or from lightning. Later Indians learned to set them to enhance the growth of the grasses that fed the animals they hunted. "The Indians understood the prairie better than the Europeans," Warkins says.

The history of the Fermilab prairie began at the time the laboratory was commissioned in 1972. Hearing that the laboratory was negotiating with the Morton Arboretum in Lisle, Ill., for help in landscaping its acreage, Robert F. Betz of Northeastern Illinois University in Chicago suggested that part of it be turned into a tall-grass prairie instead. The suggestion led to a meeting among Betz, Ray Schulenberg of the Morton Arboretum, the late David Blenz of the Cook County Forest Preserve and Donald R. Getz, assistant to the director of the laboratory. Getz suggested using the area in the accelerator ring for the prairie. The project is under the oversight of a committee of laboratory staff members, but Betz and Schulenberg remain advisers to it.

Planting began in the spring of 1975 with seven acres sown with 30 pounds of seed per acre. The seed was obtained by volunteers who went out into places where there were isolated stands of prairie plants and picked it. Over the years more and more tracts have been seeded. As of summer 1982, 196 of the total 617 acres had been planted; 235 remained to be planted. One hundred and thirty-eight of the acres are considered unplantable; 24 make up a stand of oaks that are to become an oak savannah, also a feature of the primeval landscape, and 24 are over electrical cables and can be sown only by hand on the surface, if at all.

The size of the Fermilab tract allows experimentation with different methods of tillage and planting to see which is most effective. In some tracts the ground has been plowed, in some it has been disk harrowed, in some places not tilled at all. Seeding has been by a Nesbitt seed drill, by a highway salt spreader and by hand. Disking and the salt spreader seem the preferred methods for the future with broadcasting by hand over the cables and in tight places.

Warkins remarks on the irony of using such "agronomic methods" to reestablish a natural ecosystem. In fact, some of the acreage planted by the Nesbitt drill still shows signs of having been planted in rows, hardly a primeval feature. In defense Warkins says that this seems to be the only efficient way to reestablish prairie on such large tracts. Agronomy goes so far indeed that established plots are harvested with a combine in the fall to provide seed for new plots.

The basic scheme is to let the main prairie grasses, bluestem grass (genus *Andropogon)* and Indian grass *(Sorghastrum nutans)*, get a good start and then introduce the less numerous species, especially the forbs, which include the prominent wildflowers and broadleaved plants. Warkins intends to write his master's thesis on the results of his experimentation with various methods of introducing forbs into the grassy plots. This can even include setting seedlings by hand (from agronomic to horticultural methods). To aid this effort there is a forb garden in the center of the tract, which provides seeds and seedlings. On the market, Warkins says, forb seeds can cost $100 per pound.

All this raises the philosophical question whether what one gets from this activity really resembles a natural prairie. Warkins points out that a prairie is a constantly changing thing. The mix of species and their interrelationships are not static. What one has here is a mixture of native species in reasonably authentic proportions, and the future of the experiment is to see how they develop in interaction with one another.

One of the most heartening things learned from the experiment so far is that the prairie grasses do prevail. On their native soil they seem to have an advantage over Eurasian intruders. The prairie grasses are seen to be invading areas where they were not deliberately sown and beginning to choke the weeks. The prairie grasses compete especially well in years of drought, Warkins says. Their roots go deeper than those of Eurasian species and so get water while the weeds dry out.

The prairie grass starts slowly. In a recently seeded plot it is only about half a foot tall — a typical first season growth — and invisible unless the weeds are parted, but given time and frequent fires, the grass does grow. The first plot, planted in 1975, is now "a showpiece" of restored prairie. Warkins is enthusiastic as he gives a visitor a guided tour.

Among the Indian grass and bluestem, he points out the forb species: "A pretty flower, aster, one of the species that needs a while.... Wild indigo *[Baptisia leucanthia]* does well ... wild quinine *[Parthenium integrifolium]* ... prairie dock *[Silphium terebinthinaceum]*, one of the largest-leaved plants." Prairie dock's tall flower stalks stick up above the grass. It shows how plants select areas, he says. In one particular spot a lot of prairie dock stands together. "A little knoll, just a foot or two higher." It makes that much difference in the available moisture. "*Coreopsis*. It tends to stick all over your pants. Compass plant *[Silphium laciniatum]*. Its leaves always face one direction." Settlers used it to find their way. "Purple prairie clover *[Petalostemum purpureum]*, beautiful purple spike on it. You get the feeling of how the settlers felt."

"From year to year your prairie's going to change," Warkins says. "There's not any standard." He points out tracts where already after only a few years grasses are diminishing under the competition of forbs. "You don't have the hundreds of species, but you have got a matrix. The habitat's here. It could be 50 or 100 years before everything finds its place." By then even "some things we call weeds might become part of the prairie ecosystem." Even if they are of Eurasian origin they may acclimate themselves and find their niche.

Another advantage of the Fermilab tract is that it includes both wetlands and mesic (neither too wet nor too dry) prairie. Prairie marsh can thus be developed and the relation and transition between it and the mesic prairie can be studied. "As you get lower and lower here," Warkins continues the tour, "you get these nice cattails. The transition will probably go from mesic prairie to wet mesic. As you go on, you get into the cattails. Then you wind up in a pond." The pond is inhabited by trumpeter swans. Here, too, the mixture of cultivation and wildness is apparent. These birds have spent time in the Brookfield Zoo and are relatively tame. They come right up to humans looking for food handouts. This region is a bit on the eastern edge of their original habitat, Warkins says. Sandhill cranes are expected to be introduced later.

In addition to deliberately introduced animals, insects, small mammals (and even large ones — Warkins says he sees deer in the spring when the grass is still short) and birds are finding their way into a habitat they consider congenial. As we walked, a red-tailed hawk hovered above us, hunting mice and other small animals. The laboratory has a herd of buffalo. Buffalo dearly love prairie grass. Warkins says they will choose it in preference to cultivated hay or bluegrass, but there are no plans to turn the buffalo loose in the prairie. A single square mile is too little for them. They would chew it to nothing in short order. □

Books

Books is an editorial service for readers' information. To order any book listed or any U.S. book in print please remit retail price, plus $1.00 handling charge for each book, to **Book Order Service**, Science News, 1719 N Street, N.W., Washington, D.C. 20036. All books sent postpaid. Domestic orders only.

The Biology of Anxiety — Roy J. Mathew, Ed. "There is general consensus," the introduction says, "that anxiety is present in varying degrees in all psychiatric and physical illnesses." This book is the Proceedings of the 14th Annual Symposium held at the Texas Research Institution of Mental Sciences, Houston, November 5-7, 1980. Brunner-Mazel, 1982, 299 p., $30.

The Cenozoic Era: Tertiary and Quaternary — Charles Pomerol, translated by Derek W. Humphries and Evelyn E. Humphries. A systematic summary of the stratigraphy and paleontology of the Cenozoic rocks. Takes as its central reference point the regions of Western Europe, Northern Africa and the Mediterranean Basin. Wiley, 1982, 272 p., illus., $67.95.

Ellie: A Child's Fight Against Leukemia — Jonathan B. Tucker. This story is a fictionalized composite of three actual case histories that provides a realistic, supportive and optimistic picture of what goes on today in cancer treatment for childhood leukemia. HR&W, 1982, 338 p., illus., $15.95.

Locomotion of Animals — R. McNeill Alexander. Tells how animals travel around on land, in water and in the air. Explains the mechanisms of locomotion, their limitations and their energy requirements. Blackie (Methuen Inc.), 1982, 163 p., illus., $35, paper, $18.95.

The Road to Jaramillo: Critical Years of the Revolution in Earth Science — William Glen. The story of how an international cast of scientists produced the discoveries that led geologists to accept the theory of plate tectonics and continental drift. Working mainly in the decade 1957 to 1966 on separate and seemingly unrelated problems of young-rock dating, geomagnetic polarity reversals and seafloor spreading, these scientists confirmed the theory that has transformed the earth sciences. Stanford U Pr, 1982, 459 p., illus., $37.50.

The Space Shuttle Operator's Manual — Kerry Mark Joels and Gregory P. Kennedy. A book that tells how the space shuttle works. Includes instructions for launch and ascent linked to a foldout reproduction of the shuttle's instrument panel. Tells how to live within the shuttle — what to wear, how to get dressed, eat, sleep, drink and stand. Explains personal hygiene and gravity problems. Describes how to operate each part of the shuttle, including the remote manipulator arm and the space telescope. Discusses emergency procedures. Leads the reader through entry and landing procedures then lists all of Columbia's capabilities. The excellent illustrations give one a feeling of actually being in the space shuttle. Ballantine, 1982, 160 p., illus., $22.50, paper, $9.95.

Test-Tube Babies: A Guide to Moral Questions, Present Techniques and Future Possibilities — William A. W. Walters and Peter Singer, Eds. Explains for the general reader the *in vitro* fertilization and embryo transfer techniques developed by Carl Wood and his colleagues at the Queen Victoria Medical Centre, Melbourne. Articles by moral philosophers, theologians and lawyers then discuss some of the complex moral and legal issues raised by these techniques. Oxford U Pr, 1982, 165 p., $16.95, paper, $8.95.