

1947. After World War II, presidential science adviser Vannevar Bush and other leaders persuaded corporate executives that "basic science led directly and rather quickly to new technology," inaugurating a new era of basic research. Corporate laboratories completed the change toward academic-style research; the laboratories themselves were frequently relocated in suburban office parks, literally and symbolically far from the plant and corporate headquarters.

As early as the 1950s, however, corporate managers began to sour on the "ivory tower" approach. Where was the new nylon or the new transistor?

Today, says Smith, the search is on for a

new model. He doubts that a return to the days of the heroic individual inventor is possible. The upstart Silicon Valley firms that have revived these hopes relied on two big institutions: from the Pentagon came research money and from AT&T's once-famed Bell Labs came technology and personnel. But American corporate laboratories no longer seem to have the knack for good applied science, either. So what will the next phase of the business-science marriage be? Perhaps the partners may try living apart, Smith suggests. A portent may be GE's sale last year of the RCA research laboratory to the RAND Corporation, thus creating a huge independent research establishment.

RESOURCES & ENVIRONMENT

Pedal Power

"Reinventing the Wheels" by Marcia D. Lowe, in *Technology Review* (May-June 1990), Building W59, MIT, Cambridge, Mass. 02139.

Maybe all those cab-dodging downtown bicycle couriers know something. Traffic jams and air pollution, not to mention the shortage of decent radio stations, make driving a car in the city a hellish experi-

ence. Buses and subways are often crowded and slow. So the urban messengers—along with some gridlocked policemen in London and Los Angeles—have turned to the bicycle.



America's first bicycle craze began in 1876. In 1884, a California man even set off to cycle around the world; it took nearly three years. Here, cyclists take a break near Tallahassee, Florida.

The humble bicycle, insists Lowe, a Worldwatch Institute researcher, is a kinder, gentler form of transportation that ought to figure prominently in the nation's transportation plans. "All you have to do," one California town official told her, "is make it easier to ride a bike than drive a car. People will take it from there."

Over hill and dale? Through rain, sleet, and snow? Lowe does not say. But a few pro-cycle societies have taken some bold steps: Bicycle parking towers dot the cities of Japan; Swiss buses are

equipped with bike racks to encourage "bike and ride" travelers; one Canadian aid group is even redesigning the bicycle rickshaw to better accommodate Asia's shorter drivers. In China, of course, the bicycle is king of the road. In the Netherlands, the most "bicycle friendly" of the industrial nations (and one of the flattest) the government spent \$230 million to expand bicycle parking and build special "cycleways." Today, 20 to 50 percent of all Dutch trips are made on two wheels.

At least one American municipality, the

college town of Palo Alto, California, has given the bicycle a chance to show its stuff. The city has spent \$1 million since 1980 on bike lockers, racks, paths, and a two-mile "bicycle boulevard" downtown. All road patching must meet smoothness standards, and bike-detecting sensors change traffic signals for bikers.

Lowe believes that America should go the way of Palo Alto. Yet, she laments, the bicycle was barely mentioned in the U.S. Department of Transportation's recently announced national transportation policy.

Fad Farming?

"Alternative Agriculture" by Bette Hileman, in *Chemical & Engineering News* (Mar. 5, 1990), 1155 16th St. N.W., Washington, D.C. 20036.

"Alternative agriculture" has been much in the news since the U.S. National Research Council (NRC) published a controversial report last fall hailing its promise. By and large, says Hileman, a *Chemical & Engineering News* editor, it is not what its critics or its supporters claim.

Even the term "alternative" is a little misleading, since it conjures up images of peasant dresses and pony tails. Most of the farmers who are experimenting with new agricultural techniques (and they are a tiny minority) are more concerned about paying their feed and fertilizer bills than about singlehandedly saving Planet Earth. From the Left or the Right, ancients or moderns, they will borrow any technique that works. So many are trying ridge tillage, a system developed in China 3,000 years ago that minimizes cultivation and thus can sometimes reduce soil erosion and weeds. From the contemporary chemistry lab there is now a new soil test that allows farmers to determine the minimum amount of synthetic nitrogen fertilizer needed to obtain maximum yields.

That may not sound revolutionary, but research shows that farmers steeped in modern "high-chem" agriculture habitually overapply synthetic fertilizers. One specialist estimates that a good test could cut fertilizer use by one-third and outlays by \$100 million annually in the state of

Iowa alone. To paraphrase an old saying about politics, however, all farming is local. So different soil tests must be devised for different areas of the country. Likewise, the results of alternative agriculture vary from place to place. Pest control methods that work in arid California can't often be used in Florida's hot, humid climate. And because alternative agriculture is new and only spottily employed, its advocates lack the large-scale statistical studies needed to prove their claims.

What does seem clear to Hileman is that "high-chem" farming has its limits. For example, David Pimentel, a Cornell entomologist, estimates that while the use of synthetic pesticides has grown 33-fold since 1945, annual crop losses from insects, weeds, and diseases have grown from 31 percent to 37 percent. Twenty years ago, shortly after they were introduced, herbicides virtually eliminated the need to cultivate fields. Today, cultivation is back. With surprising speed, about 80 out of some 500 weed species have developed resistance to herbicides.

Since the NRC's report, there has been a lot of debate about alternative agriculture. The best thing anybody can do, says Hileman, is to get out of the way—by restructuring federal farm subsidy policies that discourage alternative methods—and leave the choice to the farmers.