EDITORIAL

PERNICIOUS DOCTRINE

In the wake of the criminal conviction of two former high-ranking Federal Bureau of Investigation officials, W. Mark Felt and Edward S. Miller, for authorizing break-ins without warrants, it is reported that the Department of Justice still subscribes to the doctrine that the President has "inherent" power, including the power to authorize break-ins. It is a pernicious doctrine with a long history, and it dies hard.

President Grover Cleveland invoked inherent power in jailing Eugene V. Debs during the Pullman strike of 1895 to keep the mail moving. That was upheld by the Supreme Court. But when Harry Truman seized the steel mills in 1952 to prevent a strike from interfering with arms production for the Korean War, the Supreme Court said that "the President's power, if any...must stem from an act of Congress or from the Constitution itself." When Richard Nixon asserted inherent power to block publication of the Pentagon Papers, the Supreme Court said that he violated the First Amendment. Nixon also claimed inherent power to authorize warrantless wiretapping, but the Supreme Court ruled unanimously that such power did not exist in domestic security cases.

The Supreme Court has not yet considered warrantless wiretaps of foreign embassies or of foreign spies, which have been upheld by lower courts. No doubt, the Justice Department relies on those decisions in contending that the President has inherent power to authorize break-ins of homes belonging to persons believed to be foreign agents. Messrs. Felt and Miller might well feel bitter about their convictions when the agency prosecuting them says their only sin was not getting higher approval. We take some reassurance from the message of the convictions—that even the F.B.I. must follow the law—but remain disheartened by the Justice Department’s belief that the President need not.

GENETIC ENGINEERING

BONANZA IN THE BIO LAB

JOEL GURIN & NANCY E. PFUND

Late last month, Harvard shocked even the most seasoned of academic observers with its announcement of plans to "go commercial" with its talent for genetic research. Harvard president Derek Bok outlined a scenario in which Harvard would play a major role in setting up a genetic engineering company and retain partial financial interest in its operation. The venture, it was explained, would enable the commercial exploitation of Harvard's research patent. In so doing, Harvard could derive potentially lucrative profits from its genetic research department.

Reactions to the proposal, and to others like it in academic institutions across the country, ran the gamut from euphoria to outrage. Perhaps the bluntest reaction came from Cambridge City Council member Alfred Velucci, a veteran critic of Harvard University in general and of Harvard University's genetic research in particular. In a Boston Globe article, he said Harvard officials "should change Veritas [the school motto] to a dollar sign and change their color crimson to green."

Ten years ago, a proposal like Harvard's would have been unheard of, let alone blurted across the pages of major newspapers. Biologists used to be the innocent scientists. Nuclear physicists, chemists and electrical engineers discovered long ago that they had world-shaking skills and that industry would pay a high price to use them. Biologists, in contrast, often seemed impractical, even whimsical, as they assiduously studied the genetics of the fruit fly Drosophila or the sex life of the sea urchin.

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the reduction was due to three long strikes and "severe winter problems" in the United States. Joy did complain of "weak market demand" overseas. If this was a euphemism for "no bribes, no business," Joy disguised it pretty well.

Joy is not alone. Dresser (number ninety-five on Fortune's list) produces equipment for energy processing and conversion, refractories and mineral products. It is a growing, profitable company. Revenues nearly tripled over the last six years from $1 billion in 1973 to $3 billion in 1978. A 1976 Dresser inquiry turned up a total of $230,000 in isolated "grease" payments in five foreign countries. These payments facilitated customs clearances, helped get contracts awarded and settled tax difficulties. None of these payments were recorded as bribes. Nor would they necessarily be considered violations of the Foreign Corrupt Practices Act. Management denied "that there would be any impact on [Dresser's] consolidated assets, sales or net earnings" if it stopped doing it.

Cincinnati Milacron is the leading U.S. producer of machine tools. Even though president James A. D. Giver claims that the company has lost foreign business because it cannot pay legitimate sales commissions, sales have risen steadily over the period before and after the corrupt practices act, with the exception of 1976—before the act was passed. In 1974, sales were $452,785,000 and in 1978 sales reached $633,724,000, the highest in the company's history. A 1977 report revealed that in five earlier years the company had spent $5.2 million for commercial bribes. The report added that stopping such payments would not "have a material adverse effect on the consolidated financial position or results of operations of Milacron."

A manufacturer of steel plate structures, and number 471 on the Fortune listing, Chicago Bridge and Iron Company (C.B.I.) claims to have lost "in excess of $100 million of sales over the last three years." William Freeman, senior vice president for finance, asserted to The Wall Street Journal that he believed the losses resulted from situations "where we think the element of bribery was at least present." C.B.I. has never reported that it has paid bribes.

When C.B.I.'s net income dropped in 1978, shareholders were told that the principal factors lowering earnings were charge-off provisions, an Iranian loan, a plant closing in Alabama, excess overhead and continuing operating difficulties in Italy. Nowhere in the annual report was there mention of the contracts lost for lack of bribes. In 1977, shareholders were forewarned to expect lower earnings in 1978 "because of the low level of new business taken in 1975 and 1976"—i.e., before the Foreign Corrupt Practices Act.

The examples could be multiplied, but the short of it is the White House's figure of $1 billion in lost exports due to the inability to bribe remains undocumented. The companies' claims of losing money just are not borne out.

There are reasons to doubt that bribery helps business. The S.E.C. says that "we have not found in our review that bribery is a necessary or material factor to the success of American business. Indeed, we find in every industry where bribes have been revealed that companies of equal size are proclaiming that they see no need to engage in such practices." Bribery has costs—to the international reputation of the United States. Milton Gwirtzman put the issue well in The New York Times Magazine: "A foreign policy that at one stroke can justify bribes, the purchase of influence, the overthrow of governments and the assassinations of foreign leaders subverts not just the free-enterprise system but all our national ideals... If American policy results in more revolutions [due to corruption and bribery], not only will U.S. influence be destroyed but trade will cease and the assets of American firms will be expropriated. Thus, even by the test of the most singleminded corporate manager, bribery is ultimately bad for business."

The S.E.C. has at least tried to address the problem of bribery. But it hasn't gone far enough. The commission has allowed companies to accept consent decrees neither denying nor assuming guilt. Their punishment has consisted of a promise not to do it again and an investigation by the company's own, hardly disinterested board. The public is entitled at least to an investigation by the S.E.C., which is paid by the public.

The Federal Communications Commission recently became involved in the bribery debate when it denied broad-casting licenses to RKO General because it was a subsidiary of General Tire, which has admitted to making questionable payments. This action is probably the most significant punishment suffered by a company because of bribes.

Companies cannot have it both, or all, ways. They give their stockholders plausible business reasons for declining profits. If they are caught bribing, they claim that the bribes and their effects are immaterial. Finally, they say that millions of dollars have been lost while their business has been growing as usual. Why can't they keep their stories straight? The evidence is overwhelming that American corporations have been crying wolf on the bribery statute; as the profits show, there is no wolf at the door.

The Foreign Corrupt Practices Act won't stop all foreign bribery. It may stop U.S. companies from out-bribing one another for foreign contracts. Until every country outlaws bribery, and enforces it, internally and externally, there will be payoffs. Let the United States be the first. We can use some polish on our international image.

Bonanza

(Continued From Front Cover)

Now biology has entered the marketplace. Scientists have learned to make living cells do their bidding and sput out products of tremendous commercial potential. Bacteria have been designed, through laboratory tinkering, to produce hormones, the ingredients of gasohol and lubricants useful in oil extraction. Mouse cells have been taught to make very pure antibodies that may find a range of uses, from diagnosing hepatitis to treating leukemia. Living, breeding cells, appropriately enough, have become the foundation of a growth industry.

The new "biotechnology" has already captured the
Public eye, though no product has yet hit the market. The newspapers have been flooded with stories promising biological miracles, thus giving readers a one-sided view of the new technology. At the same time, scientists have found it difficult to balance the often contradictory roles of researcher and entrepreneur. Visions of million-dollar discoveries have made many biologists secretive and intensely competitive, and scientific communication has begun to break down.

Last June, the Supreme Court granted General Electric the right to patent a genetically engineered bacterium—a "bug" that can consume oil spills. The ruling was welcomed by the directors of several growing research companies that have sprung up to develop genetic technologies. Genentech Inc., a leading genetic engineering firm whose stock recently shot up from $35 a share to $88 in a single day, proclaimed: "The Court has assured this country's technology future." On the other side, the radical People's Business Commission saw the ruling as the first dangerous step to genetic tinkering with human beings. "The Brave New World that Aldous Huxley warned of is now here," said the commission. Similarly, the general secretaries of the National Council of Churches, the United States Catholic Conference and the Synagogue Council of America issued a joint statement warning of "a new era of fundamental danger triggered by the rapid growth of genetic engineering." "Given all the responsibility to God and to our fellow human beings," they asked, "do we have the right to let experimentation and ownership of new life forms move ahead without public regulation?"

The patent ruling did not really mean that much to the genetic engineering businesses; they were prepared to protect their inventions through trade secrecy if the Supreme Court declared they were not patentable. The parties with the greatest interest in the Supreme Court ruling are the universities—especially Stanford and the University of California, San Francisco—and the scientists who work for them.

Patent Absurdity?

The new biotechnology is based primarily on the technique of recombinant DNA, commonly called "gene-splicing," which enables scientists to "recombine" human, plant and animal genes—coded on molecules of DNA—with genes from bacteria. In the early 1970s, Stanford geneticist Stanley Cohen, U.C.S.F. biochemist Herb Boyer, and their co-workers were the first to publish these methods. Based on these early papers, the two universities are staking out the most grandiose patent claim in the gene-splicing field: they are trying to secure rights to all products manufactured through recombinant DNA techniques, as well as the methods themselves. The Supreme Court decision, which involved bacteria that had been altered by simpler means than recombinant DNA, opened the way for the claim that Stanford and U.C.S.F. filed in 1974.

One Stanford biochemist privately holds that "the patent as it was written is so broad as to be ludicrous," and the courts may well agree. But whether or not the universities can make good their claim, the very attempt to patent this sweeping discovery has already had repercussions in labs around the country. Patents, which are commonplace in fields like chemistry and electronics, have been alien to academic biology. Cohen himself never thought of patenting his techniques. The application was filed only because Stanford's patent officer saw an article about recombinant DNA in The New York Times and convinced Cohen to apply for a patent a mere week before the filing deadline. Even though Cohen and Boyer waived their own right to royalties from the invention, many of their colleagues saw the patent application as an unseemly attempt to profit from academic work: the pursuit of knowledge leading to the pursuit of a buck.

Biological discoveries have become bankable property. But who owns this valuable scientific knowledge? Cohen himself has characterized the development of recombinant DNA techniques as "the result of multiple discoveries carried out by many individuals over a period of time." Some of those individuals, however, are not willing to grant Cohen and Boyer full credit for the invention of recombinant DNA techniques. The most vocal protest has come from Robert Helling, a biologist at the University of Michigan, who came to California on sabbatical to work with Boyer. Helling co-authored the paper on which the patent application is based, and has refused to disclaim his role in the discovery, as Stanford's patent attorney has asked him to. The refusal is based on principle, not economics. "I can't imagine that I would ever get any money" from the patent, says Helling. "I just am not going to sign some paper saying something that's not true."

Beyond that, Helling, like many others, believes that no university should be able to claim the rights to a technology as extensive as recombinant DNA. "It's very funny to think that Stanford and the University of California, which are two of the wealthiest universities in the country, are so cheap that they're trying to claim the patent rights to an entire field...patenting the entire basis for one of the most important areas in science now," he says. In Helling's opinion, "it isn't appropriate."

Helling's work with the Stanford and U.C.S.F. teams was in the classic tradition of scientific collaboration. But with increasing pressure to patent, researchers will hesitate to publish until their patent claims are secure. Two months before the Supreme Court decision, Stanford biochemist Paul Berg—generally considered one of the most thoughtful men in the recombinant DNA field—reflected on the changes that the pressure to patent will bring. He told the story of a British colleague at the Medical Research Council (M.R.C.) who had claimed for a year and a half to have developed an experimental system that was "far superior" to other methods of gene-splicing. "He couldn't talk about it, and he couldn't send it around," said Berg, "because the

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M.R.C. was applying for a patent.” Berg’s prediction: “If you put an inducement on patents, you will very definitely get people to clam up.”

Cloning Money

Even before patents became an issue, the commercialization of biology had begun to put a chill on scientific collaboration. Starting in the mid-1970s, some biologists became consultants to industry, while others started their own gene-splicing companies. Recombinant DNA labs produced a hybrid as strange as insulin-producing bacteria: the biologist-turned-businessman. The new breed of biologists know that their discoveries may be worth money as well as professional recognition, and scientific competition, normally brisk, has run wild as a result. [See Tabitha Powledge, “Who Owns Life?” The Nation, October 13, 1979.]

Colleagues at some universities have found themselves on opposite sides of the corporate fence and have taken to hiding their experimental protocols in locked drawers. “Let’s say you have one department with three people, each a member of a different company. What does that do to communication within the department?” asks Berg. “It’s war.” Graduate students, for their part, often grumble about doing the hard laboratory work while their mentors are off “cloning money.” Many bright young scientists are starting to leave the universities to work for industry—often in direct competition with their former colleagues on campus.

Most of the new recombinant DNA companies were started by alliances of university researchers and venture-capital firms. U.C.S.F. biochemist Boyer founded Genentech, a University of Michigan biologist started Genex and other academic researchers have begun more recombinant DNA companies with equally futuristic names and plans. The process, as one observer describes it, is simple: “Get together a consortium of five or six scientists, split the company between the scientists and the people who put in the money, and those scientists will do the work in their university labs.” The arrangement is convenient, but it raises a major question: Many of these scientists have used university resources—which the public has paid for through Federal funding—to do work that could net them a personal fortune. Boyer, for example, owns stock in Genentech that is now worth around $50 million.

Such dubious arrangements are not unique to recombinant DNA research. Academic biologists in other areas are helping found small but growing companies. A new method for manipulating mouse cells to produce super-pure antibodies, called “monoclonal” antibodies, is proving eminently marketable. These antibodies may be used to diagnose many kinds of illnesses, produce vaccines and even treat some forms of leukemia.

Like gene-splicing, this biotechnology is being developed largely by academic scientists who have entered the commercial sphere. Immunologists from Philadelphia’s Wistar Institute play key roles in the monoclonal-antibody company Centocor. And Hybritech, a company started by the same venture-capital firm that started Genentech, has used the expertise of scientists from the University of California at San Diego. Boston Biomedical Consultants has estimated that the market for monoclonals will pass the half-billion-dollar mark within seven years, providing a substantial lure for academics in the field. Henry Weinert, a member of that consulting firm, told the journal Science that “Most experienced university-based investigators are almost to a person either directly or indirectly involved in commercial [monoclonal antibody] ventures.”

The Interferon Story

Business and science, however, have traditionally been two very different games, with almost opposite sets of rules. A scientist, for example, is not supposed to announce his work to the public until it has been published in a respected professional journal, or at least presented at a formal scientific meeting. This procedure sets uniform standards for establishing scientific priority. What’s more, it helps protect the public from being misled by premature, or downright erroneous, reports of “breakthroughs.” In business, on the other hand, you may have to grab for headlines as soon as you can get away with it, or risk losing valuable publicity. As an increasing number of biologists have started their own gene-splicing companies—and have attracted funding from corporations as large as Standard Oil and Eli Lilly—corporate rules have won out. The result has not been good for either science or the public.

Take the case of interferon. On January 16, Harvard biologist Walter Gilbert called the press to a Boston hotel to make a dramatic announcement. The shaggy-haired scientist has an international reputation—he and Berg recently shared a Nobel Prize for their DNA work—and the reporters were an attentive audience. Gilbert told them that
bacteria had been “taught” to produce interferon, a human hormone being tested as an experimental treatment for viral infections and cancer. The success came from the Zurich laboratory of Charles Weissman, who belongs to Biogen S.A., a recombinant DNA firm that Gilbert helped found. Many researchers had been in a race to make interferon and compound that could prove less active, and they only produced it in minute amounts. At best, the process Biogen published would require hundreds of liters of bacterial culture to produce enough interferon to treat a single cancer patient for a single day. Nonetheless, the national news media reported the birth of a potential wonder drug. The excitement ignited by Biogen was soon fueled when the American Cancer Society announced that it was adding more than $3 million to its interferon research program. Interferon appeared on the cover of Time, presumably making it the Drug of the Year.

Investors read the papers. The day after the press conference, Schering-Plough, a part owner of Biogen, jumped ahead on the stock market. In the following weeks, major drug companies scrambled to grab a part of the interferon market and to tell the world—and their stockholders—that they had a piece of the action.

The public also responded to the hype, clamoring for interferon, even though the drug was still very experimental and its usefulness uncertain. Mothers of children with leukemia began to contact interferon researchers and beg for the hormone as their last hope. Frank Rauscher, vice president of the American Cancer Society, called the urgent pleas for interferon his “continuing nightmare.” Predictably, an industrial concern, in this case a Florida company called Life Sciences, stepped forward to meet the demand—at a stiff price. By selling the drug only within the state’s borders, the company sidestepped the Food and Drug Administration’s regulations regarding experimental drugs. Interferon, it seemed, was in danger of becoming the biggest cancer-treatment fad since Laetrile.

By summer, medical leaders were actively trying to stem the tide of interferon publicity. In late May, clinicians at the San Diego meeting of the American Association for Cancer Research learned of several studies that found interferon only marginally effective—and, for some cancers, notably less effective than conventional drugs. Soon after that meeting, the American Society of Clinical Oncology issued a formal public warning: “There is no evidence or even remote suggestion yet to indicate interferon may cure advanced cancer,” and “no acceptable evidence” that it can extend patients’ lives, “regardless of the type or stage” of cancer they have.

A half-year of interferon buildup, set in motion by the Biogen announcement, came to an end—but not before Biogen lost its claim to a headstart in the race for this tarnished prize. In June, Genentech announced that it had produced interferon by a process thousands of times more efficient than Biogen’s, and had joined with the drug house of Hoffmann-La Roche to produce and test the compound.

Recently, Hoffmann-La Roche’s claim to interferon was also challenged—not by another drug company but by the University of California. Some of the cells Genentech used to make interferon came originally from the lab of a U.C.L.A. biologist, David Golde. Golde had distributed the cells to colleagues in a spirit of scientific exchange and the cells eventually ended up in the Hoffmann-La Roche laboratories. Golde now claims that he never intended his cells to be used commercially and the university has charged Hoffmann-La Roche with “unauthorized use” of this valuable material.

The irony of interferon’s rise and fall is that it all could have been avoided if the hormone’s potential had been viewed more objectively at the start. In an interview shortly after the Biogen announcement, Stanford immunologist Thomas Merigan, who has worked with interferon since the 1960s, stressed that it would not be a cure-all. Interferon, he predicted, “will end up finding certain very specific niches in clinical medicine; it’ll be used at certain stages in certain diseases.” But Merigan felt that the slow, careful research needed to find interferon’s “niche” would be hard to do in the prevailing climate of excitement and impatience. “The more money people invest, and the more it becomes a board-of-directors decision, the more [investors] want people to reassure them that they’ll have results quickly,” he said.

The Corporate Connection

Unfortunately, the confusion of commercial and scientific interest is beginning to spread throughout academic biology departments. Rather than censuring the entrepreneurs on the faculty, the heads of many of these departments are beginning to follow their example. With the recession underway, the Federal funding that has traditionally supported basic research has become unreliable. Increasingly, research-oriented universities and medical schools are turning to industry to plug the leaks.

Several liaisons have already been formed, and more are in the offing. Monsanto has funded a multimillion-dollar drug research project at Harvard Medical School, Yale has leased on-campus laboratory space to Miles Laboratories, and Stanford’s School of Medicine is planning to establish
an ambitious collaborative research program with industry. [See David F. Noble and Nancy E. Pfund, "Business Goes Back to College," The Nation, September 20.] The largest private supporter of biomedical research is probably the Howard Hughes Medical Institute, which funds research at a dozen medical schools. The institute has insisted that the universities it funds set up special Hughes laboratories and consider its researchers to be Hughes employees. These special enclaves, housing an elite corps of Hughes investigators, have caused considerable tension on some campuses.

There is an obvious danger that university research will be tailored to the demands of the industries that fund it. This has become a major source of concern at the Cold Spring Harbor Laboratory, a nonprofit educational and research institution on Long Island, New York. Cold Spring Harbor, staffed by some of the brightest biologists in the country, is a frequent gathering place for wayward Nobel laureates and others who work and give seminars in an academic atmosphere. Recently, they have been approached with offers of venture capital by General Electric, International Nickel and other firms. To some, the industrial interest seemed a godsend; the institution was expecting a drop in Federal funds. But now researchers at Cold Spring Harbor wonder if they can take the money and still maintain their intellectual independence. “Once you decide to open up to commercial interests, you change the institution in some subtle way—and it’s irreversible,” says William Udry, the administrative director of the laboratory.

Academic biologists, who have traditionally defended the purity of their research, can no longer claim to be white-coated keepers of objective truth. Like the institutions they work for, they have clear economic interests to protect. This conflict of interest may also have clouded one of the most important issues surrounding biotechnology: is it safe?

A Question of Safety

Only a few years ago, many scientists were not at all sure that combining the genes of different organisms was such a good idea. The concern about the potential hazards of the new technique was so great in 1975 that the scientific community voluntarily called a halt to certain experiments until the National Institutes of Health (N.I.H.) had a chance to establish strict safety guidelines for the work. The scientists congratulated themselves on their restraint—until the public got into the act. Soon, Alfred Velucci, then the Mayor of Cambridge, Massachusetts, was warning against “Frankenstein monsters” that might be produced in the labs of Harvard and M.I.T. Cities from Ann Arbor, Michigan, to San Diego considered community regulations on the research. The biologists learned a bitter lesson: when they faced the public again, they would tell a very different story indeed. And so the headlines now proclaim that gene-splicing will not produce monsters but miracle drugs.

Ironically, though, the recent wave of ballyhooed drug applications raises a whole new class of safety questions. Precautions that were suitable for the research setting may have no relevance at all to large-scale commercial produc-
says Krimsky, “and was finally told it could not be arranged.”

The R.A.C. has other dissidents within. More critical members, for example, such as Harvard microbiologist Richard Goldstein, charge conflict of interest. Goldstein is incensed that R.A.C. members with clear industrial ties can present themselves as pure, unbiased academic scientists. For example, he says, M.I.T. biochemist David Baltimore, a prominent member of the committee, “doesn’t have to announce, nor has he, that he consults regularly on matters of recombinant DNA for Collaborative Genetics Inc. The lay members of the R.A.C., not to mention the public, see him only as another irreproachable Nobel laureate. . . . It affects every vote we take.” Baltimore, for his part, says that he’s talked openly about his affiliation to anyone who asked. But last year, when Goldstein introduced a motion to make R.A.C. members’ affiliations publicly available, it was voted down.

Critical Immunity

Perhaps the most disturbing aspect of the current recombinant DNA outlook is the increasing tendency to answer safety questions by rhetoric rather than experimental evidence. The trend was clear at an April gathering of scientists convened by the Government’s infectious disease agency, the National Institute of Allergies and Infectious Disease (N.I.A.I.D.). On the spacious grounds of the Huntington-Sheraton Hotel in San Marino, a swank Los Angeles suburb, a veritable brotherhood of optimism was joined. Close to 100 experts had been brought there to consider if genetically engineered bacteria could cause disease by colonizing the human gut, or by triggering an “autoimmune” response in which the body’s immune system starts attacking its own tissues.

The N.I.A.I.D. had set the agenda clearly and with the best intentions. But many participants—both academics and corporate representatives—arrived having apparently decided that there was nothing to talk about. Philip Paterson, an immunologist at Northwestern University who chaired one of the workshops, begged the whole question of autoimmune disease; he was “confident,” he said, that “three million years of evolution and development” had prepared the human body to deal with any of the products of gene-splicing. In an effort to rustle up some old-time scientific curiosity, Jonathan King proposed several experiments that might shed some light on this problem. One senior immunologist responded by saying that he would indeed be interested if such experiments revealed an autoimmune hazard—“the same way I’d be interested if someone changed a mouse into an elephant.”

Several conference participants finally agreed that experiments like King’s would be worth doing in principle, but fell short of proposing them formally in their risk-assessment plan. One immunologist who supported King’s proposal explained the group’s hesitancy to endorse the experiments. “I think there’s a fear that they will only generate more experiments, more cost, and possibly slow down the pace of the research itself. At this stage of the game, that’s just not what people want.”

The researchers’ impatience is understandable. Recombinant DNA technology had a difficult birth, faced by unexpected public opposition. Now the public has been convinced that gene-splicing is the biggest medical breakthrough since penicillin, and few scientists want to raise the bogey of safety again. If no one bursts the bubble, the biologists can work peacefully on problems that fascinate them, and that may excite industry as well. It’s a little disturbing, though, to see expediency taking precedence over the scientific method and, perhaps, over public interest.

Misguided “Miracles”

None of these considerations seem to have bothered investors. When Genentech went public in October, it was greeted on Wall Street, in the words of one newspaper, as “the most spectacular new stock offering in at least a decade.” The stock began at $35 a share and soared as high as $88 on the first day of trading. Incredibly, the company had not put a single product on the market; the excitement was based solely on its imagined future promise. Biotechnology has taken off, headed for microscopic miracles and stratospheric profits. Swept away in the dizzying tailwind of genetic prophecies, few researchers are pausing to consider how much we really need the products of gene-splicing or to what purposes they should be put.

From the early days of recombinant DNA, one of the most obvious applications—and one that got the most publicity—was the possibility of manufacturing human insulin in bacteria. In July, Eli Lilly announced that the company would spend $40 million to build plants where the human hormone will be produced by E. coli. Human insulin will be a boon to those diabetics who are allergic to cattle and pig insulin—a small fraction of the total—but may not really help anyone else. Insulin is already cheap and readily available; the $40 million investment, if anything, is likely to drive up its price. Other bacterially produced hormones, like interferon, do not yet have proven clinical uses. And still others may be applied to strange ends. Some researchers have suggested that the growth hormone could be used to make cattle grow faster, a suggestion that seems rather bizarre, given the problems that have already arisen from the use of carcinogenic hormones in meat production.

Some genetic engineering schemes offer dubious high-technology solutions to problems caused by technology in the first place. The message conveyed by “bugs” that eat up oil spills and bacteria that break down the herbicide 2,4-D is that we need not worry about spilled toxic chemicals because biotechnology can fix these problems for us. But it is all too easy for this year’s miracle fix to become next year’s headache.

Recombinant DNA, like other new biological technologies, is likely to produce some very useful products, but it is not yet clear what they are. The new techniques have sparked a gold rush, and researchers have staked their claims to all sorts of new discoveries without worrying overly about their future value. The next few years will show whether all that now glitters is really gold.
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