have almost entirely disappeared, leaving only a small difference in height. None of the groups reach mean values for American children of the same age. This may reflect either genetic size differences between Korean and American children or the effects of chronic undernutrition extending for several generations in developing countries such as South Korea.

Perhaps even more striking and less in accord with previously reported experience is the fact that the mean IQ of the severely malnourished children is 102 and slightly skewed to the right. It is about 40 points higher than that reported in similar populations that were returned to their early home environments (*1, 3*). In addition, achievement in school for the severely malnourished group is equal to that expected of normal U.S. children. However, the stigmata of malnutrition had not entirely disappeared by the time these children were studied. There are statistically significant differences between the previously malnourished and well-nourished children in IQ and achievement scores. Whether these are permanent differences it may be too soon to judge. It should be noted, however, that the initially well-nourished children attained a mean IQ and achievement score higher than that of middle-class American children. It may be that these attainments (and those of the other two groups as well) reflect the select character of adoptive parents and of the environment they provide to their adopted children.

In this study all the children came to their U.S. homes before the age of three—the mean age was 18 months. Thus they spent a major portion of their early developmental years in their adoptive homes. It would be important both theoretically and practically to determine whether adoption at later ages produces similar results. Such studies are being planned.

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NEWS AND COMMENT

Recombinant DNA: NIH Sets Strict Rules to Launch New Technology

La Jolla, Calif. The signal to proceed with slow motion was given here on 5 December to a new technology whose ultimate benefits and potential risks may prove comparable in extent to those of harnessing the atom. Guidelines drawn up during a tensely argued 2-day meeting of a National Institutes of Health (NIH) committee will allow researchers to experiment with a new technique of genetic manipulation which because of its potential hazards has been under almost complete embargo for the last 18 months.

The technique involves the use of recently discovered enzymes to cut and splice the hereditary material of living organisms with unprecedented and possibly undreamed-of precision. A DNA segment carrying one or more genes can be excised from a chromosome and tacked onto another segment which may come from a quite different organism. The ability to construct recombinant DNA molecules, as they are known, is of both heuristic and practical significance. It offers in principle the means of obtaining a complete set of the genetic plans of any organism, including man. Biologists are already describing the technique in terms such as "revolutionary" and "one of the most significant advances of 20th century biology."

The practical applications so far envisaged range from equipping crop plants with nitrogen-fixing genes to make nitrogen fertilizer unnecessary, to the construction of microorganisms capable of synthesizing some of the products now obtained from oil. The recombinant DNA technique offers man power over nature in a more fundamental way than that of any other technology, because it is the power to intervene in evolution, to design and create combinations of genes in ways radically different from the slow reshufflings by which new organisms are created in nature.

Despite its promise, the new technique has been voluntarily forsworn by the scientific community because of theoretical hazards which most biologists consider to be extremely remote. The hazards stem from the fact that the properties of many recombinant DNA's likely to be constructed cannot always be predicted and may be deleterious. Should the addition of new genes confer a selective advantage on a virus or bacterium harmful to man or other forms of life, the outcome could be a catastrophe of possibly epidemic proportions.

Such horror scenarios, however incredible, are made more conceivable by the circumstance that the standard laboratory microorganism which will serve as the host for many recombinant DNA's is *Escherichia coli*, a common inhabitant of the human gut and throat. Laboratory workers often get infected by the organisms they handle, and through this means, if not by direct escape, a recombinant-containing bacterium might become established in the population at large. What cannot yet be excluded is the possibility that whatever genes have been built into the recombinant might be switched into action and interfere with the metabolism of those infected by the escaped bacterium.

This risk attaches in particular to one of the technique's most immediate uses, the so-called "shotgun" experiment, in which the total DNA of an organism is cut into segments and inserted into bacteria so that each segment may be grown in bacterial clones. Several of these segments are likely to contain harmful genes, such as those specifying any toxins the organism may

produce, or the cryptic tumor viruses postulated to exist in certain animals' genomes.

That such harmful molecules should be able to wreak damage even if they were to escape from the laboratory appears highly improbable to many who have studied the question. It is this kind of consideration, however, which has occasioned a research moratorium that is unique in the history of science and has set in motion the train of events that culminated in the elaborate guidelines laid down at the La Jolla meeting. The moratorium was called for in July 1974 by a committee headed by Paul Berg of Stanford University. An international group of scientists who met this February at Asilomar, California, voted in principle to lift the moratorium provided that certain general safety principles were met. It was left to national committees in each country to devise specific guidelines, pending which the moratorium has effectively remained in force. The NIH committee appointed to this task drafted a set of guidelines that were judged too lax by many critics including Berg, a group of 50 biologists who signed a petition of protest, and several of the committee's own members (*Science*, 21 November 1975).

The problem stated by the NIH committee here was one of considerable delicacy. On the one hand, it was faced with mounting impatience among biological researchers to set rules that would allow research to begin. Had the committee postponed decision once again, or set rules that were indeed too restrictive, there are signs that the moratorium would have been flouted, and that the ubiquitous rumors of Saturday-night experiments would have rapidly turned out to be true.

On the other hand, the rules had to be sufficiently tight to convince outsiders, particularly in Congress, that the scientific community was doing a reasonably disinterested job of self-regulation. That task is the harder because of the committee's obvious vested interest. Of its 15 voting members*, all but the chairman are active biological researchers who may one day wish to use the technique, and at least three members (Edward A. Adelberg, David S. Hogness, and Charles A. Thomas) are personally involved in recombinant DNA experiments of the limited type permitted by the Asilomar conference.

That the committee rose at least someway above its vested interest is shown by the fact that the guidelines set here are more severe than many members believe are necessary. That position was not reached easily. By the end of the first day, the committee had drawn up rules almost as loose as the draft version which provoked the initial outcry. European countries, in one foreign delegate's opinion, would probably not have found such rules acceptable. But the next day, through some mysterious alchemy, the committee changed its collective mind and rewrote the rules more strictly.

The tightness of the final version, which was accepted unanimously, probably owes much to the presence of three members of the group that organized the Asilomar conference, Paul Berg, Sydney Brenner of the Laboratory of Molecular Biology in Cambridge, England, and Maxine Singer of the NIH. Another factor that probably made tight guidelines easier to write was the apparently imminent availability of means of biological containment. This idea, one of the key principles laid down at Asilomar, calls for the use in recombinant DNA experiments of genetically enfeebled viruses and bacteria which cannot survive outside the laboratory. Despite assiduous attempts, committee member Roy Curtiss of the University of Alabama had been unable to construct a disarmed strain of *E. coli* at the time the committee drew up its first draft. A few weeks ago he succeeded, which means that the requirement for an experiment to use biologically safe *E. coli* is no longer tantamount to an embargo.

Much of the debate focused on where to place particular classes of experiments on the two-valued scale the committee had devised earlier. In brief, the scale consists of four levels of physical containment, designated P1 to P4, and three of biological, labeled EK1 to EK3 after the *E. coli* K-12 strain commonly used in laboratories. P1 consists of standard microbiological practice, P2 requires a few extra precautions,

*DeWitt Stetten, NIH (chairman); Edward A. Adelberg, Yale University; Ernest H. Y. Chu, University of Michigan; Roy Curtiss, University of Alabama; James E. Darnell, Rockefeller University; Stanley Falkow, University of Washington, Seattle; Donald R. Helinski, University of California, San Diego; David S. Hogness, Stanford University; John W. Littlefield, Johns Hopkins Hospital; Wallace P. Rowe, NIH; Jane K. Setlow, Brookhaven National Laboratory; Waclaw Szybalski, University of Wisconsin; Charles A. Thomas, Harvard Medical School; Elizabeth M. Kutter, Evergreen State College; John Spizizen, Scripps Clinic and Research Foundation.

NIH Committee Guidelines

Summary of NIH committee guidelines for containing experiments with recombinant DNA. Each class of experiment has been assigned both a physical level of containment, designated P1 to P4 in increasing order of severity, and a biological level, designated EK1 to EK3. See text for a description of the levels. Table is not the authorized committee version and is subject to error and revision.

A. Shotgun experiments with *Escherichia coli* (use of recombinants to introduce undefined segments of an organism's genome into *E. coli*, classified by type of organism)
- (i) Eukaryotic DNA recombinants
  - Nonembryonic primate: P3 + EK3 or P4 + EK2
  - Embryonic primate: P3 + EK2
  - Other mammals: P3 + EK2
  - Birds: P3 + EK2
  - Cold-blooded vertebrates: P2 + EK2
  - Invertebrates and lower plants (ferns to algae): P2 + EK1
  - Higher plants: P2 + EK2, but P2 + EK1 if cells are taken from embryonic or germline tissue
  - Higher plants that produce pathogenic or toxic agents: P3 + EK2
  - Purification: If a cloned recombinant DNA can be made 99 percent pure on a weight-for-weight basis, the P value of containment may be reduced by one level
- (ii) Prokaryotic DNA recombinants
  - Prokaryotes that naturally exchange genes with *E. coli*:
    - Class 1 agents (as classified by the Center for Disease Control), such as enterobacteria: P1 + EK1
    - Class 2 agents, such as *Salmonella typhi*: P2 + EK2
    - Class 3 and higher: Experiments banned
  - Prokaryotes that do not naturally exchange genes with *E. coli*
    - Nonpathogens: P2 + EK1
    - Pathogens: P3 + EK2 if of low pathogenicity
      P3 + EK3 or P4 + EK2 if of moderate pathogenicity

B. Use of recombinants to insert genes from viruses, eukaryotic plasmids, and organelles into *E. coli*
- Animal viruses: P4 + EK2 or P3 + EK3
- Plant viruses: P3 + EK1 or P2 + EK2
- Eukaryotic plasmids or organelles: As for the shotgun categories, unless the recombinant DNA has been rendered 99 percent pure, in which case either the P or the EK value may be reduced by one level

C. Use of animal virus vectors
- Defective polyoma virus + class 1 virus or nonpathogens: P3
- Defective polyoma virus + class 2 viruses: P4, but if the polyoma host range has not been changed and the virus segment can be proved harmless, then P3
- Defective SV40 + class 1 virus or nonpathogen: P4
- Defective SV40 + nonpathogenic and purified DNA, whether prokaryotic or eukaryotic: P3
- Defective SV40 or defective polyoma (lacking late genes) + prokaryotic or eukaryotic DNA: P3, as long as no virus particles are produced by infected cells.

such as not creating aerosols, and P3 means putting the whole laboratory under negative air pressure. The highest category, P4, involves techniques such as airlocks, protective clothing, and showering on exit, which are used in handling the most dangerous known pathogens. Some believe that the stringency necessary to operate a P4 facility is incompatible with a university atmosphere.

The lowest level of biological containment, EK1, requires the experimenter simply to use the standard K-12 strain of *E. coli*, which most—but not all—microbiologists believe is unable to colonize the normal human bowel. EK2, as now defined, stipulates the use of K-12 strains genetically altered so that on average only one bacterium in 100 million would be expected to survive in the environment outside the laboratory (the earlier draft had this safety factor set at 1 million). EK3 is an EK2 system (that is, the bacterium and associated viruses used to introduce recombinant molecules into it) for which the postulated safety factor has been proved by test feeding the bacteria to animals.

Discussion about what levels to assign to various classes of experiments was clearly influenced by particular cases that people had in mind. At one point Berg, as spokesman for a group setting rules on animal virus vectors, announced the highly detailed rules shown in the summary table and apologized for doing so at so late a stage. Whereupon someone remarked that the rules "show what beautiful progress Dan Nathans' experiments are making." (Nathans has been working in the area of animal virus recombinants.) "I don't think we can tailor the guidelines to suit the progress of an investigator," Berg replied, "to tell us this is to keep Dan Nathans in business, well—I'd like to slow him down" (laughter).

Another instance where argument was evidently guided by a particular experiment in progress was the debate that raged back and forth about how to classify shotgun experiments with the genomes of cold-blooded vertebrates. The Asilomar guidelines said that these could go ahead in conditions equivalent to P2 plus EK1, and an experiment using recombinants from the frog genome has already been started by Donald D. Brown of the Carnegie Institution of Washington. Half a dozen other researchers (none of them on the committee) are also said to be interested in the field.

Debate on this class of experiments was opened by Hogness (Stanford University) whose recombinant DNA experiments, also permitted under Asilomar guidelines, involved the *Drosophila* fruit fly. Hogness pressed for details from those who believed there was a hazard in shotgun experiments with cold-blooded vertebrates. He was answered by Brenner, who observed that "the essence of a shotgun experiment is that it explores a very large sample of the genome. That issue is the same whether we use *Bacillus subtilis, Drosophila*, or humans. So the production of that hazard is uniform." While *Bacillus subtilis* presented little cause for concern, Brenner implied, "I would worry just a little about insects. I think that the rationale [for treating one organism differently from another] ought to be spelled out, because to people from the outside this thing looks like the settling of all sorts of different bargains. That may sound obnoxious but that is how it looks."

A vote was taken and the committee agreed by 9 votes to 4 to keep the class at P2 plus EK1. But the next morning, John W. Littlefield (Johns Hopkins Hospital) reopened the issue and proposed that shotgun experiments with cold-blooded vertebrates be upgraded to P2 plus EK2. The motion passed by 7 to 6, whereupon Hogness successfully proposed an experiment using embryonic tissue of these animals

POINT OF VIEW

Agricultural Research Lacks Leaders

The agricultural research system has fallen into serving a narrow range of ideas and masters, chiefly agribusiness and the dictates of large-scale technology, and lacks the leadership to find a new ethic and create new agricultural lifestyles. So argues Don F. Hadwiger, professor of political science at Iowa State University of Science and Technology. The following extracts are taken from Hadwiger's article in the November issue of Change.*

Although agricultural researchers have not ceased to be curious or to desire challenging problems, they have nevertheless become a mature and comfortable bureaucracy. They are slow to respond to new demands and are certainly not aggressive in seeking new missions and clienteles. They have been reluctant, for example, to think in terms of alternative agricultural systems, which might have a mix of different farming practices. They will have nothing to do with organic farmers who regard themselves as the antithesis of the existing system. . . . Land-grant scientists view the organic farmer as a modern version of the anti-science preachers. . . .

Developing countries need a different mix of labor and technology than we do. But developed nations have yet to find a synthesis that respects the interests of human beings involved in production, that protects the environment, and that accepts the possibility of new lifestyles in agriculture. The research establishment may argue that such changes are for political institutions to bring about, not learning institutions (viz. China). Unfortunately for that argument, the two have often interacted to narrow the other's options.

How is the circle broken? In earlier periods, giants emerged from the scientific community, grasping public leadership to institutionalize a new ethic. Gifford Pinchot established the Forest Service. Hugh Hammond Bennett created the Soil Conservation Service. Seaman Krapp introduced demonstration farms. But no giant is yet visible within today's agricultural establishment. Those who are sent forth as its philosophers are as yet only conciliators and apologists. . . .

The agricultural research establishment remains a ship full of riches, though long at the mercy of the prevailing winds of commercial agricultural interests, which have secured its public funding and manipulated its outputs. New winds buffet this establishment—consumers, environmentalists, the media, some elected officials, enlightened insiders, and in the future, maybe, antithetical farmers and even a giant or two. But these have yet to form a coalition that can give agricultural research the breadth of perspective that a great research establishment ought to have. . . .

The academic community should accept the responsibilities implicit in its position as a determinant of the world's food and job situation. Scientists should insist on engaging in research that is worthy in their own eyes, and insist on funding it from new, as well as existing, sources. This could well mean a collective effort to corral national support for agricultural research. Moreover, they should free themselves from their present status as hired hands for the agricultural business. . . .

* Reprinted with permission from *Change* magazine, vol. 7, No. 9, November 1975.

that could still be conducted in P2 plus EK1.

The next twist in the debate was a bid by Charles A. Thomas (Harvard Medical School) to create a grandfather clause for experiments already initiated under the Asilomar guidelines. When that lost, Thomas proposed that the actual clones of recombinant DNA already constructed could continue to be used. He was rebuked by a consultant to the committee, Peter Day of the Connecticut Agricultural Experiment Station, who said that "the whole question of a grandfather clause is germane to the credibility of the committee because it is quite clear that it concerns vested interests." The committee proceeded to follow a suggestion of Brenner's that it simply require those with clones constructed under Asilomar guidelines to consult the committee about their future use.

Other changes made by the committee to its earlier draft included the abolition of a loophole in the definition to P3, the upgrading of experiments with animal viruses, and more rigorous definition of the conditions under which purification of recombinant DNA may allow containment levels to be downgraded.

Implementation of the guidelines will proceed by having the NIH committee certify EK2 and EK3 systems when they become available. For physical containment, an investigator's laboratory must be certified both by his local biohazard committee and by the NIH peer review committee to which he applies for a grant. The granting agency must also receive proof of purity when a researcher wishes to downgrade the containment level of an experiment. According to the NIH's physical containment expert Emmett Barkley, the safety cabinets required for P2 conditions cost $5000 each; to convert a P2 facility to P3 can cost up to $50,000; and rather than trying to convert an old laboratory to P4, it would be cheaper to build one from scratch at a cost of about $200,000.

Stricter than Asilomar Guidelines

The rules that the committee has now produced are demonstrably stricter than the Asilomar guidelines, even though nothing has happened since then to make the speculated risks seem any more likely. At least within the scientific community, the NIH committee's guidelines are likely to be favorably received. James E. Darnell, for example, a committee member who considers the levels stricter than necessary to protect either scientists or the public, also believes that they will not constitute a serious impediment to research.

It seems likely that European countries will adopt the same general levels of containment as those hammered out at La Jolla, thus preventing a potentially embarrassing split in the world's scientific community. The Europeans have not yet written detailed guidelines and have, for the most part, been waiting to see what would happen in the United States.

Berg considers that the new guidelines satisfy all the objections he voiced to the earlier draft, and that they are "a faithful translation of the spirit of Asilomar." They are tough on him personally, requiring that he abandon a whole series of ex-

Think Tank for Congress Advances

The long-proposed Institute for Congress—a private "think tank" that would provide policy analysis for the legislative branch to put it on a more equal footing with the executive branch—has moved a step closer to reality.

The Institute, which has been under discussion by an organizing committee for 3 years, announced on 7 December that it has been incorporated in the District of Columbia, has applied for a federal income tax exemption as a nonprofit organization, and has named a 15-person board of trustees.

The chairman of the board is Martha W. Griffiths, former Democratic congresswoman from Michigan; the vice-chairman is Republican William D. Ruckelshaus, former head of the Environmental Protection Agency and former deputy attorney general.

Other members of the board, chosen with an eye to political balance and experience in dealing with Congress, include Lucy Wilson Benson, secretary of human services for Massachusetts and former national president of the League of Women Voters; William D. Eberle of Idaho, president of the Motor Vehicle Manufacturers Association and former special trade representative for the White House; Alton Frye, senior fellow of the Council on Foreign Relations and former administrative assistant to Senator Edward W. Brooke (R–Mass.); Ben W. Heineman of Illinois, president of Northwest Industries, Inc.; Craig Hosmer, former Republican congressman from California and now president of the American Nuclear Energy Council; Leon Jaworski, Houston, Texas, attorney and former head of the Watergate special prosecution force; Gordon J. F. MacDonald, director of the Environmental Studies Program at Dartmouth and former member of the Council on Environmental Quality; Harry C. McPherson, Jr., Washington attorney and former special counsel to President Johnson; Clarence Mitchell, director of the Washington bureau of the National Association for the Advancement of Colored People; Richard B. Ogilvie, Chicago attorney and former Republican governor of Illinois; William B. Spong, Jr., Portsmouth, Virginia, attorney and former Democratic senator from Virginia; and Cyrus R. Vance, New York City attorney and former deputy secretary of defense. William T. Coleman, Jr., Secretary of Transportation, is on leave from the board during his period of government service.

James R. Killian, Jr., chairman-emeritus of the MIT Corporation and former science adviser to President Eisenhower, served on the organizing committee (along with Frye, MacDonald, McPherson, and Vance) but is not a member of the board.

The board will launch an immediate search for some $11.5 million in foundation funds to cover the first 3 years of operation. Frye, the key instigator behind the Institute, expressed "a moderate degree of confidence" that the money can be found. Thus far the Institute has been organizing with a $68,000 cash grant from the Donner Foundation and a comparable grant of cash and services from the Carnegie Endowment for International Peace, where Frye currently has his office.

The Institute would seek to build up to a professional staff of 80 persons recruited from the government, the academic community, and private research organizations. It envisions a 5-year experimental phase, funded with $22.5 million in foundation grants, after which the Institute, if successful, would operate on research contracts made with Congress.

The funds in hand are expected to carry the Institute through 30 June 1976, at which time the board expects that a final judgment can be made as to whether a full-blown institute is feasible. If the decision is "yes," the Institute would hope to begin functioning in time to serve the next Congress in January 1977.

—P.M.B.

periments involving recombinants made with the monkey virus SV40. He will lose 5 or 6 months, he estimated, in switching to the mouse polyoma virus. It was an experiment with an SV40 recombinant that aroused Berg's first scruples about the technique some 3 years ago.

It is too early to judge how the guidelines will appear to those outside the scientific community, but the committee is likely to receive some criticism on the grounds of vested interest and lack of public representation. The guidelines may look like a document of "byzantine complexity," as one observer termed it, tailored to fit particular experiments that are already on the drawing boards. It contains such apparent inconsistencies as that shotgun experiments with higher plants (which no one at present plans to do) are rated more hazardous than those with many types of animal genomes.

Yet those who argued in favor of lower containment levels were reflecting not just a personal bias but a widely held view that the hazards are being overemphasized. As evidence that it rose above its own interests the committee can point to the fact that its final guidelines are more stringent than those of Asilomar.

There are at present only a few positions in which the committee is outflanked by more conservative critics. Four scientists calling themselves the Boston Area Recombinant DNA Group has argued that *E. coli*, because of its ability to infect man, is an unsuitable host for recombinant DNA experiments and should be phased out of use within 2 years. Committee member Wallace P. Rowe (NIH) also feels strongly that *E. coli* is the wrong host but thinks people would not wait for a new host to be developed. Rowe also headed a group which recommended much higher containment levels for all shotgun experiments on the grounds that the expected hazard does not vary with the species. He, however, accepts the La Jolla guidelines.

The committee did not quite come to grips with a point raised by Brenner, that as the containment levels for an experiment are lowered, the number of laboratories attempting it will proliferate; moreover, an experiment that may be safely performed at Stanford may not be contained so well in less skilled establishments. Physical containment levels up to P3 are vulnerable to human error: of the 5000 laboratory-acquired infections in the last 30 years, one-third occurred in laboratories with special containment facilities. Even in the P4 conditions of the Army's biological warfare laboratories at Fort Detrick, there were 423 cases of infection and 3 deaths over some 25 years. Argument can thus be made about the P level assigned to any experiment, but the committee's levels are as strict as most.

Congressmen tempted to write legislation on the subject might pause to consider whether they would really do a better job. On the basis of an as yet purely speculative hazard, scientists have for 18 months held off from the use of the new technique, an act of self-denial unique in their own and perhaps most other professions. If the experiments now to be conducted make the hazards seem any more tangible, the same sense of responsibility will presumably continue to be manifested.

—NICHOLAS WADE

European Physics: New Accelerator Likely to Assure Lead in the 1980's

Hamburg, Germany. Large particle accelerators are not essential for energy research, do not contribute much to industrial productivity, and have not produced many spin-offs. Yet Europe—following a policy opposite to that of the United States—continues to support high energy physics generously. The immediate goals appear to be fundamental knowledge, rather than economic benefit, and the international prestige that goes with excellence in basic research. The Europeans would clearly enjoy the chance to surpass the United States in a field that the Americans founded and that represents in many respects the summit of technological achievement.

The latest European commitment to high energy physics was made this fall, when the West German government provided funds for a large new electron accelerator facility in Hamburg. Construction on the project is starting immediately, assuring a considerable lead over a similar American proposal, which is facing an uncertain future in Washington. The West German decision may make it possible for Europeans to excel in all kinds of particle physics research, and virtually guarantees that Hamburg will be one of the world's leading physics research centers in the 1980's.

For many years the showplace of European expertise in high energy physics research was the Centre Européene pour la Recherche Nucléaire (CERN) in Geneva, which has been competing successfully with U.S. laboratories for 15 years and has achieved some notable firsts. CERN is not only a first-rate scientific organization, it also enjoys enormous political support because it is the most successful example of pan-European cooperation on technical projects.

But in the last few years, the vagaries of basic research have shifted the focus of particle research on both continents away from the large proton accelerators, exemplified by CERN in Europe and the Fermilab in the United States, to electron storage rings, such as those in Hamburg and Stanford (*Science*, 8 August 1975). Since advanced electron facilities cost only about one-tenth as much as the latest proton accelerators, like the $600 million "super proton synchrotron" that begins operation at CERN next year, the shift of research emphasis to electron phenomena made it possible for a single European country to build a particle research facility more powerful than any existing one, and to build it quickly.

To ease the way for the electron project, the European Committee for Future Activities (ECFA) began laying down ground rules for the new electron laboratory (there should be only one and it should be open to all scientists), while various countries began vying to have the facility built on their soil. Italy proposed a 12-Gev electron storage ring, but dropped out of the running early, leaving Britain and West Germany to fight over rights to the project. Britain proposed to build a 15-Gev storage ring at Daresbury, but the government said it would support the project only if other countries helped fund it. West German scientists proposed to build a 19-Gev storage ring, and argued vigorously for the superiority of their proposal.

Either machine was acceptable to other European scientists, who wanted a powerful storage ring, but the members of the coordinating committee (ECFA) declined to decide between the British and West