portedly advised President Carter that Mexican imports could be the key to a far-reaching series of agreements.

Even though there is oil in the ground, some critics question whether Mexico is capable of extracting it at a rate that will make an impact on the U.S. market. Although Pemex makes extensive use of U.S. consultants and companies that provide technical support services, almost all the surface exploration and drilling has been done by Pemex itself. The company currently has more drilling rigs in use than all of Western Europe, and it is spending $10 to $20 million per day for exploration and development (Pemex gets one-fifth the national budget). Not only is there a crash program in exploration and development, but Mexico is also moving ahead of schedule in building 16 gas processing plants, 71 new petrochemical plants, and two new refineries. Mexico's proved oil reserves are certified by what many consider the world's leading mineral evaluation firm, De Golyer and MacNaughten of Dallas.

"The notion that Mexico could not produce the oil by itself is absurd." says Grossling, noting that Pemex has 6000 trained geologists and geophysicists and the Mexican Petroleum Institute has trained 3000 engineers in recent years. "Pemex has very good people," says Peter Flawn, chairman of the geology department of the University of Texas. "We know them and we have trained many of them," he says. He calls the Pemex organization "fully capable," and says the rate of daily production is dependent only on the amount of money Pemex spends on development. With certified reserves that are large and rising, lack of capital is no longer a limitation.

Such enormous stores of oil in a world thought to be hungrily draining its last reservoir present a potential revolution of energy expectations. Whether Mexico offers the world another 10, 20, 30, 40, or more years of oil cannot yet be determined. The stakes are high for the United States and the stakes are high for Mexico.

What seems clear are Mexico's present intentions. "We are exploring and finding reserves which will be used in the twenty-first century," said Diaz Serrano on the 40th anniversary of nationalization of the petroleum industry, "because we have already found the petroleum that Mexico will consume during the present century."

—WILLIAM D. METZ

Environmental Groups Lose Friends in Effort to Control DNA Research

In popular lore, the environmentalist has the soul of St. Francis and the nerve of a lion tamer. He is not driven by a lust for wealth or glory, but by a vision of a world in which men live in harmony with nature. Given that the environmentalists share something with the saints, it is surprising to learn that many scientists who once counted themselves friends now consider themselves adversaries of groups such as the Natural Resources Defense Council, the Environmental Defense Fund, and Friends of the Earth. The new adversaries are not industrialists, but pure research scientists, primarily academics.

Several well-known figures, including Paul Ehrlich of Stanford University, and René Dubos of Rockefeller University, publicly broke with environmental groups this year over differing interpretations of the hazards in recombinant DNA research. The break developed when the environmental groups sought to have the federal government tighten up on safety measures that apply to laboratory experiments, while scientists were working to relax the rules. The new DNA guidelines are due to be published as this is written, and, according to several people who have seen them, they will lessen physical safety standards while greatly increasing the requirements for bureaucratic and public review of experiments. As is often the case in political decisions, this remedy seems designed to mollify both parties but satisfy neither.

In telling how the controversy over DNA research has created a feud between friends, two respected biomedical researchers referred to the environmentalists they had run into as thugs, flunkeys, sharks, and worse. These scientists said they gained new insight into the tactical methods of the environmentalists by watching them lobby for controls on recombinant DNA research. Neither wanted to be quoted, although both have spoken their mind in more guarded phrases at public meetings. In recent interviews they said they were disillusioned, having come to the conclusion that some of the environmental lobbies are in business to peddle paranoia.

Although they spoke with varying degrees of acerbity, a number of prominent scientists expressed at least some ill will toward the environmentalists this year. James Watson, one of the discoverers of DNA and a combative fellow always ready to take a swat at perceived villainy, was angry enough to publish an article in the Sunday editorial section of the Washington *Post* on 14 May. He lashed out at "disgruntled biochemists" and "noisy academic leftists" for agitating against certain DNA experiments, and he accused the environmentalists of scaring the public needlessly. "I fear," Watson wrote, "that such groups thrive on bad news, and the more the public worries about the environment, the more likely we are to keep providing them with the funds that they need to keep their organizations growing."

Among those who doubt the environmentalists' good faith are National Institutes of Health (NIH) researchers Malcolm Martin, Wallace Rowe, and Maxine Singer—all of whom have been involved in the DNA debate from the outset. Paul Berg of Stanford, Bruce Ames of the University of California at Berkeley, and Norton Zinder of Rockefeller University as well as others not directly involved in the politics of DNA have told the environmentalists that they are flatly wrong in the recombinant DNA case. Because of the ruckus, and partly as a result of peer pressure, several well-known scientists have publicly criticized the environmental groups of which they were members or directors. Paul Ehrlich, a trustee of Friends of the Earth (FOE), tried to have FOE relax its policy on recombinant DNA, without success. He wrote to the director of NIH, Donald Fredrickson, on 15 September, saying that "the potential benefits from recombinant DNA research are so great that it would

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be foolhardy to restrict such research largely on the basis of imagined risks." Lewis Thomas, president of the Sloan-Kettering Cancer Center, resigned from FOE's advisory council in 1977, as he explained in a recent letter to the general counsel of Health, Education, and Welfare, "because of the civil action suit against HEW then proposed" by FOE. (The FOE filed a brief in New York challenging the legality of DNA research which is not accompanied by a full environmental impact statement.) "I am in flat disagreement on straightforward scientific grounds with the rigid position taken by their organization," Thomas wrote.

Joshua Lederberg, president of Rockefeller University and trustee of the Natural Resources Defense Council (NRDC), wrote to HEW to disassociate himself from the position taken by the NRDC. René Dubos, a trustee of the NRDC, was angry because his name appeared on the letterhead along with NRDC's comments on research guidelines being proposed by the government. He wrote to the director of NIH on 30 October: "You may have assumed that I had been consulted about the preparation of this document and that I am in favor of its recommendations. But this is not the case. I had no idea that NRDC was involved in the recombinant DNA problem, for which it has no competence. . . . Failure on the part of NRDC to communicate with me . . . reveals either an irresponsible lack of familiarity with the literature in this field, or in-

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UC Debate on Weapons Labs May Be Nearing Conclusions

The University of California's executive suite is the source of a new proposal aimed at settling the long-running debate over the university's management of the Livermore and Los Alamos nuclear weapons laboratories. UC vice-president William Fretter has recommended to university president David S. Saxon that he appoint a committee to provide an improved "two-way flow of communication" between the university and the labs.

The relationship between the university and the laboratories has come under criticism during the last decade as some faculty, students, and outside activists questioned the appropriateness of the university's tie with the labs which, in the case of Los Alamos, dates back to 1943. The critics have been divided between those who urged that UC sever ties with the labs and others who argued that the university should exercise stronger management (*Science*, 31 March).

Fretter, a former chairman of the Berkeley physics department, took over as vice-president at midyear. Saxon at the time assigned him the task of considering the university-labs relationship from all perspectives including that of a university-wide committee on the subject headed by former UCLA vice-chancellor William Gerberding. The Gerberding committee in its report last February also recommended that UC retain ties with the laboratories, but only on condition that the university assume a more active management role.

A major difference between the two sets of recommendations is that the Gerberding group proposed a board of overseers, including UC regents among its members, who would be expected to have security clearances in order to monitor both weapons programs and civilian energy research at the labs. Fretter recommends a committee appointed by the UC president which would not be linked to the regents and not have security clearance. As a consequence, such a committee would be free to hold hearings inside and outside the labs and to make public reports to the university president.

Fretter's proposal has already drawn criticism. The Livermore staff union, the Society of Professional Scientists and Engineers, has said it represents a "dilution" of the Gerberding recommendations. The UC Nuclear Labs Conversion Project, a coalition of groups and individuals opposed to nuclear arms, and Berkeley student groups have objected to Fretter's recommendations as weaker than the Gerberding group's. The critics are also pushing Fretter to change an 8 January hearing to gather comment on his proposal to an open public hearing involving the regents.

Fretter so far has made his proposal only in oral form at a meeting of the regents' special research projects committee on 17 November. He is expected to provide a written version this month. The Berkeley faculty's academic senate in late November was set to vote on a committee proposal urging that the university sever its links with the labs. After debate, however, the senate voted to table the measure until its members were able to study the Fretter recommendations.

Conversion project spokesmen complain that attempts in recent months to conduct open forums or debates at Livermore have been rejected. They say that the organization's efforts to obtain information on weapons programs at the labs have also been rebuffed, and they have been told that social and political analyses as well as technical information on the projects are classified. They say this leads them to doubt the credibility of any monitoring group which lacks security clearance, as would the committee Fretter proposes.

At this point, indications are that the UC administration is persuaded that continuation of the UC management role is in the public interest and it is seeking an acceptable formula for maintaining the tie. The critics, on the other hand, appear more skeptical that UC management will be effectively bolstered, and now seem to be leaning more strongly toward advocating termination.

Bishops Rescind Job Cut but Two Leave Values Panel

The National Conference of Catholic Bishops has affirmed its support of its committee on human values through which it keeps in touch with developments in science, but has done so only after some backing and filling which resulted in the resignation of the committee's two staff members.

Elimination of the two staff positions was proposed in September, by the panel which serves as the executive committee of the conference, as part of a reduction in programs and personnel intended to avoid a 1979 deficit. Among the jobs affected were those of Sister Ann Neale, executive director of the human values committee, and Kathryn Rucker, research associate. Also included in the projected cuts was support for services of activist priest Msgr. George Higgins. Reaction to these cuts—particularly objections by organized labor to actions affecting Higgins—were very sharp.

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tellectual dishonesty in using my name for a cause that I regard as ridiculous." He ended by saying that he would resign from the board of NRDC forthwith.

Dubos could not be reached for comment, but John Adams, the executive director of NRDC, said the letter of resignation had been withdrawn. "It was quite unfortunate . . . an unpleasant experience for all of us." Adams said that the NRDC is trying to patch up its relations with the scientific community. He expected that the split—which he claimed was the result of poor communication more than substantive error—would soon be mended.

The campaign to bring the environmentalists to heel, which bears the marks of an organized effort, has had an impact. Adams said the NRDC is reconsidering its DNA policy. He and his colleagues are trying to decide whether it makes sense to continue lobbying for tighter control of this research without the backing of NRDC's most respected scientists. "Is this an issue for which there is no technical support?" Adams asked. "Without the scientific support in the field, we see ourselves with a difficult row to hoe. . . . When there is a split the way there is now, we have to be prepared to reassess." He was stung by the recent criticism from the scientists, whom he said had abandoned a cause they themselves created: "They are the ones who left. I blame them. We haven't changed our policy."

The Environmental Defense Fund (EDF), another group active in this area,

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A reversal was ordered in mid-November by the administrative committee that serves as board of directors of the conference. Higgins has said he will remain at the conference until his scheduled retirement in 1980. Neal and Rucker, who had been put on notice in September, decided to carry through with plans to leave the conference. Neale plans to teach ethics part-time at Catholic University in Washington. She is a member of HEW Secretary Joseph Califano's committee on the rights and responsibilities of women and expects to be more actively engaged in the work of that committee.

Neale was appointed the first executive director of the human values committee in 1975. The committee's major function is to monitor scientific developments and keep the bishops informed on those likely to raise ethical or doctrinal issues. The committee, for example, drafted a statement on recombinant DNA research which was approved by the conference's governing board (*Science*, 10 June 1977). During the past year it has concentrated on exploring the ethical aspects of energy policy. Small conferences involving philosophers, theologians, scientists, and engineers had been held, and there were plans to broaden the scope of the effort.

Neale declines to discuss her reasons for leaving the secretariat. In a statement made in leaving the conference she said "I rejoice in the recent decision to continue the Secretariat for Human Values because it reaffirms the Church's commitment to dialogue and liaison with the scientific community," and she offered "all possible assistance" in the transition.

Conference officials say that the search is on for new permanent staff and that the bishops remain firmly behind the human values committee, which continues to be one of the few efforts going to relate theology and technology.

Association Row Keeps a Touch of Class

Along the stretch of Massachusetts Avenue known as "association row" because of the concentration of nonprofit organizations in the neighborhood, big, boxlike office buildings are displacing the hodgepodge of buildings of widely varying style and scale put up in the early part of the century. The stateliest survivor has been a five-story building in beaux arts style at 1785 Mass Avenue. Constructed in the teens as a luxury apartment, it is familiarly known as the Mellon building for Andrew Mellon, the tycoon and philanthropist who occupied the fifth-floor apartment there in the 1920's and 1930's. Since World War II, 1785 has housed offices rather than the social elite. During the 1960's, most of the building was occupied by the American Council on Education before the ACE left for the hive of higher education activity in the new office building devoted to that purpose across Dupont Circle. Although 1785 has been a sentimental favorite, other potential occupants among the nonprofits, including the AAAS, have been put off by the problems of satisfactory conversion posed by the building's high ceilings, thick walls, and general design for gracious living. Fears were growing that the developers would take over and the wreckers soon move in. Such a fate, however, has been averted by the action, appropriately enough, of the National Trust for Historic Preservation, which bought the building and is renovating it for a headquarters.

The trust is a private, nonprofit organization which accepts custody of nationally significant properties with adequate endowments. It owns, for example, the Stephen Decatur and Woodrow Wilson houses in Washington. The trust bought 1785 from the Brookings Institution next door for $1.3 million of its own funds. Renovation is expected to cost $2.5 million in all; half is being raised through a $1.25 million fund appeal and the other half is to come from a federal matching grant under the National Historic Preservation Act of 1966. Trust officials say that the proceeds of the fund campaign have passed the $1 million mark with a $250,000 grant from the Kellogg foundation topping contributions by private foundations, corporations, and individuals.

The renovation is scheduled to be completed by summer 1979. The building's original floor plan will be followed and as much interior detail as possible restored. Air-conditioning equipment will be sequestered in the rear walls of the building so as not to mar the elegant line of the mansard roof. The trust will occupy the bottom three floors and the top two floors, including Mellon's long-term Washington pied-à-terre, will be leased, presumably to suitably nonprofit tenants.

John Walsh

also ran into trouble. At one point the Washington, D.C., staffer who was lobbying for tighter DNA guidelines, Leslie Dach, was called before EDF's executive board to justify his work and explain some remarks he had made to the press. Dach's supervisor, Joseph Highland, said that "in terms of flak caught per dollar spent" the DNA program produced a "much higher" rate of antagonism than anything else EDF has done. Highland estimated that EDF spent at most $1000 on this project in 1977, a sum which came out of a budget of $250,000 for work on toxic chemicals. The EDF does

Conference on Nuclear War Not Peaceful

From philanthropist Stewart Mott to the Unitarian Universalist Association, the liberal Establishment gathered in Washington on 7 December for a 1-day "Nuclear War Conference" paid for with a $25,000 check from actor Paul Newman. Newman, sitting on the podium all day under the television lights, distinguished himself at the meeting not only by virtue of his status as a movie star but because he kept quiet—unlike his fellow panelists and the 300-member overflow audience.

The conference's flyer said it "aimed at permitting the public to understand the problem of nuclear war in concrete, realistic terms . . . not in generalized abstractions with little meaning. . . .

"It is high time the American public be given the facts, clinically and objectively, about the realities of nuclear war" it said. But the way the conference unfolded demonstrated how hard this is to do with this grave subject.

Conference cochairmen were Gene R. La Roque, the Navy admiral-turned-dove who runs the Center for Defense Information, and Richard J. Barnet of the Institute for Policy Studies. The panelists discussed ways nuclear war could break out. Richard Falk of Princeton said that the weakness of the dollar and America's perception of her loss of power in the world could make her feel sufficiently impotent to try some bold military stroke. Jerome D. Frank, a psychiatrist, discussed how national leaders could decide to push the nuclear button if "the prospect of the destruction of one's self-image is more damaging than the prospect of bodily death. . . . History is strewn with the bodies of civilizations whose leaders' judgments failed under pressure." George B. Kistiakowsky, the Harvard chemist and former presidential science adviser, admitted that wars are caused "by geopolitical conflict" but nonetheless detailed how the "advent of ever more sophisticated weapons is the main source of military instability." (Later, in answer to a question, Kistiakowsky gave his own formula for avoiding nuclear war. "What to do with nuclear weapons? Leave them alone. Put them in storage. They will rot, like everything else, and then no one will be willing to use them.")

Author Harrison Salisbury said nuclear war would most likely break out between the Soviet Union and China, but that the United States would probably be drawn in, as it has been in other wars in this century. Three retired military officers offered scenarios in Europe and Africa showing how the first use of nuclear weapons—perhaps escalating to large-scale exchanges—could take place.

But with virtually none of the papers available to the audience, and a relatively unstructured discussion plan, the "clinical and objective" approach seemed to get lost.

Audience and panelists began plying their own pet, often contradictory, peeves. La Roque at one point announced that the real "enemy" was the military, to whom Americans had abrogated responsibility. Harvard Nobelist George Wald shortly countered that the real master of both military and the civilians was big business. Journalist I. F. Stone, from the floor, denounced American policy towards Iran.

The confusion thus created was epitomized in an exchange begun by Homer Jacks of the World Conference on Religion and Peace. Jacks, from the floor, asked actor Newman what he thought of the fact that the United States had voted against a recent United Nations resolution that the use of nuclear weapons would be "a crime against humanity." Newman replied with a statement about terrorism, and then asked pyschiatrist Frank to comment on "how much does every new weapon under development add to the miscalculation of terms" in nuclear war. Frank's reply was that "nuclear war would not be started by an insane person, but by a sane person under stress."

Things got a little more disciplined during the afternoon, which included a rousing prepared speech from Senator John Culver (D-Iowa). Several panelists discussed the effects of fallout and the effects of radiation on the Bikini islanders and the Japanese, the two main populations available for study of the effects of weapons bursts. But the afternoon, too, became a long exposition of things that people in the room didn't like. Question after question was directed to the Administration's civil defense chief, Bardyl Tirana. (People who think the public should remember the horrors of nuclear war don't like civil defense, because if the public believes in civil defense it might be convinced nuclear war is survivable and be less resistant to starting one.) But the initially constructive dialogue between the audience and Tirana eventually deteriorated. Nearly the last question of the meeting was hurled at him by a woman who claimed to have known him before he became the government's civil defense chief 2 years ago. "What is it about government service that unhinges peoples' minds?" she demanded, and, not waiting for an answer, strode away from the microphone.

Afterwards, cochairmen Barnet and La Roque were saying that the meeting's main value was in the extensive media coverage by public radio and network television. (Within a few days of the conference, it became clear that the public reaction was indeed large.)

But, apparently conscious of that mass audience beyond the conference room, several participants seemed concerned that the meeting had not seemed more constructive. From the floor, journalist Stone said: "Tirana will carry the day because to the distant observer he will seem to be the only one to come forward with a constructive plan."

Stone said that civil defense would not remove the threat of nuclear war, but more fundamental institutional changes could. "If you live in a lunatic asylum, one strategy is to wear an asbestos nightgown and get a bulletproof vest and carry long, sharp knives. But a better approach is to get the hell out of the lunatic asylum."—DEBORAH SHAPLEY

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not plan to mute its criticism of DNA research techniques but, like the NRDC members, the staff feel uncomfortable about tackling the leaders of biomedical research in their own territory.

The leader and still the most active participant in the environmental campaign to control research on DNA is Friends of the Earth. It helps an associated interest group called the Coalition for Responsible Genetic Research, directed by Francine Simring. The FOE is the only group that went to court. It has no plan to seek an injunction or any other obstructive action at this time. It has simply put its objections on file. The mere threat of legal action has pushed the government into taking some precautionary measures, however. One NIH researcher argues that FOE's purpose is to slow down research by any method available, simply because that is its business. If this is correct, FOE has been quite successful. The NIH has been tied up in knots of bureaucratic consultation and administrative legalisms over DNA for many months since the experts decided that the dangers inherent in their experiments were minimal.

Richard Hartzman, FOE's attorney, said that despite the criticism he has received from Lewis Thomas, Paul Berg, and Paul Ehrlich, FOE intends to remain active in biomedicine. Its president, David Brower, strongly supports the campaign to regulate DNA research.

Hartzman, Adams, and Highland view the scientists' protests as special pleading of a kind they have seen many times before, but never coming from such close friends. Hartzman said, "The experts always feel that they know what they're doing—look at the nuclear program. They can't make a judgment for us of what is an acceptable risk." Like other environmentalists, he said that the biomedical community is getting its first taste of public policy review and not liking it any more than the auto industry, the coal companies, or the pipeline builders did when it happened to them. Scientists who resent the interference in their work answer by saying that the outsiders are not so concerned with the public interest as they are with spinning out "procedural fluff" to keep themselves busy.

Who has the most authoritative claim to be a legitimate spokesman for the public interest in technical debates like this one? The scientists believe they are the best judges of what is wanted because they are best able to understand the risks and benefits of research and to predict the outcome. Yet the environmentalists claim to be better suited to speak for the public because, in theory, they have no vested interest in seeing that the research is speeded up or slowed down. They bring a global outlook which seeks to have the same principles of common sense and safety applied to every hazardous venture. However, as the critics point out, the environmentalists have a large stake generally in campaigns that slow the proliferation of technology, and they have a specific investment in slowing down recombinant DNA research. The public interest, *c'est moi*, Ralph Nader might say. And environmental activists sometimes seem to believe that the public interest is embodied in whatever they decide to do.

A couple of scientists wanted to know by what authority the environmentalists claim to speak for the common good. These private agents of the public interest are not elected, nor are they necessarily in touch with the views of rank-and-file members of the groups they speak for. The staffers who argued the case for restricting DNA research appear to have been somewhat casual about getting in-house support for their action. Dubos's letter and others suggest that even the trustees were not always kept up to date.

A survey of the groups mentioned earlier revealed that all three held executive meetings initially to decide whether or not to become involved in the DNA debate. But the more recent campaign to tighten research guidelines, which broke with the prevailing sentiment in the research community, seems to have received prior approval (though not trustees' approval) in two groups. In the third case, at NRDC, the policy is still in debate. What sort of democratic procedure do these groups use to include the membership in routine policy-making? The common response to this question was that members are kept informed through the newsletters.

If the environmentalists seem casual about soliciting lay advice, the scientists seem downright hostile to the idea. Many experts believe that nonspecialists are unable to understand the debate, much less contribute to it. For those who harbor such doubts, the DNA controversy confirms their belief that science does not benefit, but may suffer, when agitated citizens are invited into the inner sanctum. Maxine Singer argued, as she has throughout the DNA debate, that the environmental groups misunderstand or willfully misinterpret the nature of the debate. She believes that DNA research is fundamentally different from other enterprises in which the environmentalists become involved. Unlike pesticide manufacture or nuclear fuel processing, this research poses no proved hazards. The risks that are thought to be present exist only in the minds of the researchers themselves. They are purely conjectural, and Singer said that conjectures ought not to govern policy unless they come from the experts. If the environmentalists had proof that the by-products of recombinant DNA research had done some harm, then they would be right to sound the alarm. But no such proof is in hand, Singer argued.

Another scientist, who worked on the research guidelines, seemed most upset by the environmentalists' campaign to seat representatives of the public interest on the advisory boards at NIH and at the scores of sites where research is being done. These boards, which will be required to include at least two members each from outside the institution that sponsors the research, will be empowered to monitor and approve experiments. The guideline-writer shuddered at the thought of having political activists looking over the shoulder of reseachers all around the country. He doubted that any good would come of the public review requirements.

Although the gene-splicers may wish to withdraw and do their work in private, it is now impossible for them to do so, according to Halsted Holman, an immunologist at Stanford Medical School and a student of the sociology of science. He said, "There is no way they [DNA researchers] can change the momentum they have created." The public is not going to be kept out of the discussion on genetic engineering, which is what the recombinant DNA research portends. "It was inevitable that this would become a public matter," he said. Rather than running away from the controversy, Holman believes, scientists must learn to explain what they are doing and make a case for their work in popular terms. People who say that expertise must retreat when the politicians come near are "absolutely, totally wrong." They are doing science a disfavor, in his view. His most persuasive argument is quite pragmatic: scientists really have no choice but to answer public critics. If genetic research fulfills just a few of the promises now being made in its behalf, it can hardly avoid attracting public attention—a kind of attention that may make the environmentalists' interest seem tame.

—ELIOT MARSHALL

Erratum: In T. R. E. Southwood's review of *An Introduction to Population Ecology* by G. Evelyn Hutchinson (20 Oct. 1978, p. 301), the sentence beginning on the 19th line of the third-from-last paragraph should have read "Persons mentioned in the footnotes are included in the general index" rather than ". . . in the general text."