prospect of economic benefit from so costly a scheme, and that so far there was little movement into industry of the skilled scientific engineering and technical manpower trained by participating in high energy physics." It was also observed that the offer to eventually turn off Britain's two existing accelerators to pay for CERN was not realistic. (One of those who helped promote that offer told *Science* that it certainly was not realistic. "But it was a desperation move. We made it in good faith, but what would happen when the time came to do it is something else.") Finally, the Council was told that, since the CERN machine is not likely to be located in England, if the two existing accelerators were shut down there would be no domestic research at all into high-energy physics. The account of the meeting closed with the remarkable assurance that "the decision in no way altered the understanding that the Government did not interfere in the exercise of the Research Council's own judgment on the allocation of resources allocated to them."

On the final day of the parliamentary session, when various odds and ends kept the House going till dawn, the 300-Gev decision came up briefly and several members assailed the government with material that obviously was supplied by irate members of the scientific community. Among the ammunition was, of all things, a quotation from a 1960 report of President Eisenhower's Science Advisory Committee, warning against expecting short-term results from basic research.

The House of Commons Select Committee on Science and Technology plans to hold an inquiry into the matter, though no date has yet been announced. And various scientists who are aggrieved by the decision are looking forward to an opportunity to bring it further out into the open. Whether this matters at all, at least as far as the CERN machine is concerned, is a separate question. So far, France is the only major CERN participant to express an intention to support the project; that expression was a qualified one, and it is said that, with its present economic troubles, France would not object to an opportunity for a graceful exit.

Meanwhile, of course, there is still a lot of life in CERN's present machine, and there will be a lot more when a major storage ring project, now under way, is completed. Also it is worth noting that, though publicly the high councils of science have closed ranks in behalf of the 300-Gev project, there are a few luminaries of science who scoff at the fuss. As one of them put it, "It's no disaster. The world will go on. Our problem in this country is to learn to pay our way. Basic science doesn't pay." In a country that is, properly, obsessed with its economic problems, a lot of people are talking that way, and this may, at least in part, explain why the government chose not to heed its scientists' advice on the value of high-energy physics.

—D. S. GREENBERG

National Parks: Traffic Jams Turn Attention to Roads

Many of our [national] parks are no longer a place of escape and repose, but a massive traffic jam as nerve-racking as a 5 o'clock urban rush.—SENATOR FRANK E. MOSS of Utah, in a speech on 1 August in the United States Senate.

Senator Moss's complaint is no doubt shared by thousands of tourists returning home this summer from visits to popular national parks such as Yosemite, Yellowstone, and Great Smoky, where the automobile is taking over. The steadily rising volume of park traffic not only frustrates visitors but threatens the integrity of the parks by generating demands for ever more roads, more parking areas, and more campgrounds for the huge motorized cavalcade of truck-campers and trailers.

As conservationists and environmental biologists have long observed, roads scar the landscape and disturb the ecology of the wild areas upon which they intrude, sometimes drastically, as when migration routes of elk or other large animals are blocked or when invasion routes for exotic and undesired plant and animal species are created. In the face of mounting pressure from the automobile, the National Park Service (NPS) now seems to have concluded that radical solutions must eventually be adopted.

Over the past year or so the Park Service has revised its policy on roads and transportation within the parks. Current policy is set forth in a special task force report in which three major points are emphasized.

1) Before any new park road is built there must be a finding, by professional ecologists, that it will have "minimal" effects on the habitat and movement of wildlife, on plant communities, on stream drainages, and on other natural regimes. In fact, the Park Service's chief scientist is under orders to "walk the centerline" of every new road proposed for construction. This new attitude is far different from that which prevailed even a few years ago. In 1966, for example, when the Park Service proposed a new transmountain road in Great Smoky Mountains National Park (*Science*, 1 July 1966), no study of the possible ecological consequences had been made. (Secretary of the Interior Stewart L. Udall last year rejected this road proposal after strong protests by conservation groups.)

2) An esthetically pleasing park road is one designed to "lie lightly upon the land." Heavy cuts and fills must be avoided. The goal is not to achieve technical excellence in road construction but to preserve the integrity of the landscape, respect ecological processes, and give the visitor a sense of intimacy with the countryside through which he is passing.

3) The Park Service is to study all modes of transport that hold promise of providing alternatives to new and existing roads. Moreover, it hopes to try out such alternative systems in parks (or recreation areas) where traffic congestion already is a problem or in new parks where few roads exist.

The Park Service is investigating the capabilities, costs, and possible effects on terrain and natural communities of monorails, tramways, minirails, helicopters, hydrofoils, and other systems. Plans for prototype systems are being

developed for several NPS units, although Congress is not likely to appropriate funds for even modest pilot projects until current wartime budgetary stringencies have been eased. The report of the Park Service task force observes that, "while many park administrators and conservationists in the past have been unalterably opposed to replacing roads with tramways, funiculars, and other such developments, in many cases these would have done far less permanent damage to the park environment."

Resisting pressures for new roads and possibly using other forms of transport as substitutes for some existing roads may be no easy matter, however. Historically, the development of the National Park System (formally established by Congress in 1916) has run parallel to, and been stimulated by, the development of the private automobile and the national highway system. Almost 40 million people visited the 32 national parks last year, and most of them came by automobile. Many of these visitors were annoyed by the heavy traffic; the conventional remedy that such congestion suggests is, of course, more roads.

Senator Moss's complaint was not that the capacity of park road systems can never (as the Park Service now believes) catch up with the increasing traffic demands. On the contrary, he was insisting that more roads be built, enough to provide easy access for even the most sedentary visitors to up to 25 or 35 percent of the park territory (as much as 95 percent or more of the area of some parks is now roadless). Moss had, in fact, a particular ax to grind, for the Park Service had canceled plans to build a new road in Canyonlands National Park, in his home state of Utah, on the grounds that it would be damaging to park values.

In keeping with its new policy of putting respect for the landscape and ecological values ahead of visitor convenience, the Park Service now plans a system of jeep trails instead of the new road. Similarly, in Mesa Verde National Park, in Colorado, plans to build a new modern road to the newly excavated Wetherill Mesa ruins have been canceled. Visitors will reach these ruins over an old, twisting, rebuilt fire road.

For the moment, however, given the agency's tight budget, few new roads would be built even if Park Service policies were unchanged or even if Senator Moss spoke for a majority of his congressional colleagues.

Yosemite National Park had 2.2 million visitors last year most of whom came by private car—creating scenes like this. [Photograph by the Fresno *Bee*]

This period of financial stringency, when the pace of all development activities is slower than usual, may allow the Park Service time to catch up a bit on its ecological studies—studies that may later prevent blunders in planning roads or other park transport systems. Although congressional appropriations for natural history studies have always been meager, George B. Hartzog, Jr., has come to regard such research as essential to management and is now supporting it from management funds. Currently, the natural science research staff, in Washington and in the field, numbers about 27 professionals, of whom a third are Ph.D.'s. The funds available this year for contract research and support of in-house studies total about $250,000—nearly 10 times the amount available several years ago. But this budget is still modest in terms of the need, for millions of acres of park land should be studied.

Technical studies of roads and other park transport systems are the responsibility of the Park Service's design and construction office. William S. Rosenberg, deputy head of this office, offers his personal, unofficial vision of how the automobile might be banned from a major park, with visitors, wildlife, and the natural scene the better for it.

Consider how this hypothetical system would operate on a tour of Yellowstone. Assume that a Chicago family of four stops off for a quick tour of a few of the park's most famous spectacles. After arriving at Gardner, at Yellowstone's north entrance, they leave their car and take one of the monorail trains which make frequent stops at park entrance points. They are now on Yellowstone's "mainline" system, designed to move people about quickly between those principal park attractions and visitor centers which earlier were linked by road. This elevated system allows them sweeping scenic views, while itself intruding far less conspicuously upon the landscape than the road it has replaced.

The Chicagoans begin their tour with stops at Old Faithful geyser and Canyon Village. At the latter, the family (which includes small children for whom rugged hikes and back-country

NEWS IN BRIEF

• **BIKINI RETURN:** Former inhabitants of Bikini Atoll, the U.S. nuclear test site in the South Pacific, have been given permission by the Atomic Energy Commission (AEC) to return to the atoll. The last nuclear test at Bikini was 10 years ago. The natives were removed to another of the Marshall Islands when testing began more than 20 years ago. The island has been deemed safe for human habitation as a result of an AEC study conducted last year on residual radioactivity in the area. Some strontium-90 was found in coconut crabs, which will be destroyed; otherwise, the AEC found no significant threat to health and safety.

• **METRIC SYSTEM STUDY:** After a period of 9 years during which bills have been stalled in the House of Representatives, a bill authorizing a 3-year study of the proposed increased use of the metric system in the United States (*Science,* 5 July) was signed by President Johnson on 14 August. The bill provides that the study be conducted by the National Bureau of Standards of the Commerce Department on a year-to-year basis out of already appropriated funds at a cost not to exceed $500,000 for the current fiscal year.

• **SEA-GRANT EXTENSION PROGRAM:** A compromise bill, which authorizes a 2-year extension of the Sea-Grant College program and increases financial support substantially, was signed by President Johnson on 14 August. The measure, introduced by Senator Claiborne Pell (D–Rhode Island) and Representative Paul G. Rogers (D–Florida), represents an effort to increase trained manpower for oceanography programs. The amount authorized is $6 million for the current fiscal year and $15 million for the succeeding one, compared with $5 million authorized for last year.

• **NONPOLLUTING ENGINE:** Private industries in three countries are pooling their money and facilities in a 3-year $7 million research project aimed at developing a nonpolluting automotive combustion engine. Eleven automobile and petroleum companies in the U.S., Japan, and Italy formed the Inter-Industry Emission Control (IIEC), which was launched last year to find ways to eliminate the principal pollutants from incomplete combustion of petroleum. The Ford Motor Company is project manager, and the participating U.S. oil companies include American, Atlantic Richfield, Marathon, Mobil, Sohio, and Sun.

• **EARLY MAN DIG:** A California archeological project, which has been in dispute with holders of alleged mining claims nearby, has been given approval to continue its excavations. The Department of Interior has announced that the "Early Man Dig," located in the Calico Mountain area near San Bernardino, has been given permission to continue its excavations unhampered by 10-year-old mining claims, which were recently declared invalid. The archeological investigation, sponsored by the San Bernardino County Museum, has unearthed possible prehistoric man-made implements.

• **OHIO SCHOOL BOARD RESEARCH:** More than 70 school boards in Ohio are contributing their own tax-derived school funds for a research project aimed at identifying and solving educational problems. The 3-year applied research program, now funded at more than $600,000, will be conducted largely by the Columbus Laboratories of Battelle Memorial Institute in the following problem areas: surveying public educational preferences; studying personnel negotiations; and evaluating and improving staff programs and administration.

• **NEW PUBLICATIONS:** *An Energy Model for the United States, Featuring Energy Balances for the Years 1947 to 1965 and Projections and Forecasts to the Years 1980 and 2000,* Information Circular 8384, may be obtained for 70¢ from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. *International Directory of Genetic Services* is available free of charge from the Medical Department, National Foundation–March of Dimes, 800 Second Avenue, New York 10017. *Public Health Service Grants and Awards, Fiscal Year 1967 Funds, Part I,* may be obtained at $2 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.

trips are out of the question) leaves the monorail and boards a minirail train for a 6-mile round trip to Yellowstone Canyon. Some parts of the canyon may be seen from the train itself, though it passes well back from the north rim of the canyon and is not visible from the south rim. The visitors make frequent stops, however, walking to various overlooks, then boarding other trains to make their way around the circuit. Later, the family gets back on the monorail but then leaves it again briefly for an excursion by aerial tramway to the summit of Mount Washburn. The family's visit to Yellowstone ends back at Gardner—after a tour of about 150 miles in which no one had to fight traffic.

According to present Park Service policy, the new systems would be used only as substitutes for roads which now exist or (as in the case of new parks) which would have to be built. Moreover, existing roads and parking lots, Rosenberg says, could be regraded, replanted, and allowed to return to nature. The slaughter of wildlife by heavy traffic would cease, he adds, for monorails would pose little hazard for deer and other creatures.

The idea of using monorails and other new systems as a substitute for park roads has gained currency among some conservationists outside the government as well as among Park Service officials. In fact, three conservationists —Joseph Penfold of the Izaak Walton League, Ira Gabrielson of the Wildlife Management Institute, and Ansel Adams, a nature photographer closely identified with the Sierra Club—served on the task force that drafted the Park Service's statement of current policy on roads and alternative systems.

Rosenberg believes the principal problem to be overcome in establishing the kind of park transport system he envisions is that of getting the money. By his computations, however, the cost of the new systems, on a per-passenger-mile basis, would be little more than that of the automobile-road system.

As Rosenberg is fully aware, Congress is not likely ever to provide funds for the radically new transport systems unless the public is ready to accept them. But, on this score, he is not pessimistic. All the traffic jams in urban, suburban, exurban, and now even park settings have not been for nothing, he feels. "People," he says, "are getting a little bit tired of their automobiles."

—LUTHER J. CARTER