lished by Teller in collaboration with the University of California at Davis has about 100 graduate students in the program at Livermore.

More elusive, is the value to the lab of the university connection in recruiting of staff. There is general agreement that the UC tie makes the labs more attractive to prospective employees from academe. Many staff members obviously feel that the university aura also helps to give the lab a more relaxed, less bureaucratic atmosphere. One weapons scientist observed during an interview, for example, that he doubted that he would be talking to a reporter at all if the lab were run by a government agency or an industrial contractor and that he valued the latitude provided.

This view is shared to some extent by SPSE members, but they are quick to point to important ways in which the lab differs from a university. Basic research is restricted effectively to work closely relevant to lab projects. Beginning professional salaries at the lab compare favorably with junior faculty salaries, but flatten out sooner than university salaries. Rules on consulting and benefits from patients are much more restricted

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The Quick, the Dead, and the Cadaver Population

The Department of Transportation has issued a stop-work order putting all work with the cadaver population into suspended animation.

The Department has been prompted to this exercise of its powers by Congressman John E. Moss of California. During the recent debate on air bags, Moss learned that dead bodies had been used to assess the protection afforded by the devices to passengers in car crashes.

He wrote to the Secretary of Transportation saying, in effect, that the Department had better have good reason for its use of cadavers because many would find such research morally offensive. Moss is chairman of the House subcommittee on oversight and investigations, and his opinions are of interest to the Department of Transportation.

Department officials soon ascertained that Moss himself was among those who found such research morally offensive. It was explained to Moss that almost all the cadavers so used come from the "willed body program," and that family permission is secured whenever possible. Crash testing requires an insignificant number of bodies compared with other uses, such as in medical schools. The information gained from cadavers is regarded as critical to the design of better dummies, and the present research program will be completed by 1980.

In full understanding of all these reasons, Moss replied to Secretary Brock Adams on 6 January, he nevertheless adhered to the view "that the use of human cadavers for vehicle safety research crudely violates fundamental notions of morality and human dignity, and must therefore permanently be stopped."

The Department issued 90-day stop-work orders to its six contractors in mid-November, and the ban is being continued by mutual agreement until 1 July, when a review of policy will have been completed. Some observers believe the Department may just be trying to wait Moss out—he has announced that he is retiring at the end of this session—but others say that Joan Claybrook, the new head of the National Highway Traffic Safety Administration, is interested in a serious review. The issue is not likely to become a political bandwagon: most congressmen seem interested in keeping as far away from it as they can.

One research contractor is at Wayne State University. Asked what he will use instead of cadavers in crash tests, chairman Albert I. King says "Living volunteers—but at lower g's." Wayne State uses about 10 to 20 cadavers a year in its crash test program.

Moss's inquiries elicited from the Department of Transportation the following official account of how cadaver crash testing came into being. Originally, it seems, crash studies were performed on "a dummy representing a 50th percentile male." Unfortunately a court "found the dummy insufficiently objective as a test device." After further test and development, "the Hybrid II dummy was adopted . . . as the official measuring instrument." One feature lacked by the Hybrid II dummy was the characteristic known as "biofidelity." It behaved well in frontal crashes but failed to mimic human kinematics in side and rear crashes as well as in pedestrian impacts.

The search began for an advanced dummy. But design of a better dummy required comparison with the real thing. "Of all available surrogates for the human body, the cadaver possesses by far the greatest mechanical and geometrical similarity with the living person," the Department of Transportation explained to Moss. True, cadavers were of different shapes and sizes, but "the variability of the cadaver population accurately reflects the variability of the population of living humans which the safety standards are designed to protect." Not that cadavers are perfect: "It is generally recognized that a number of limitations exist in using the cadaver as a surrogate for a living human being." Nonetheless, "prohibition of cadaver use for trauma research would set back progress towards these important ends many years into the future," the Department of Transportation concluded.

Moss read this document, but was persuaded to the opposite view.

Contrary to Fears, Public Is High on Science

The public is sometimes said to be "anti-science," but the evidence of recent public opinion polls undertaken in the United States and nine European countries show, on the contrary, that public attitudes toward science are strikingly favorable.

The scientific community in the United States "is greatly concerned about public attitudes toward science and technology because it perceives a deterioration in these attitudes to be the cause of many of its current problems," notes the National Science Board in a recent report.* But the evidence of surveys conducted for the board by the Opinion Research Corporation in 1972, 1974, and 1976 indicates that "the public continues to have an overwhelmingly positive general reaction to science and technology."

The public's esteem for scientists in 1976 was second only to its esteem for physicians. Seventy-one percent of the

**Science Indicators 1976.* Government Printing Office, Washington, D.C. 20402. $4.75.

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for lab staff than for university researchers. And the lab pay and promotion system heavily favors administrators over scientists who stick to R & D work.

SPSE members conceded that they think the university connection has had something of a "benign influence" in protecting people who have exercised the relatively new option of criticism at the weapons lab. "At the beginning," said one veteran scientist, "people did not have the idea they could dissent." Now they do, but the SPSE members say that the organization took the precaution of associating with the California state employees union before they took on management.

SPSE steers clear of weapons policy criticism and arms control issues. A range of attitudes on these subjects are held among the members, but the organization does not discuss or take stands on matters such as nuclear testing or the neutron bomb. Such discussion would only be divisive, says SPSE leaders, and the organization needs to maintain solidarity when dealing with issues of pay, promotion, and working conditions and when commenting on the quality of administration and of science at the lab.

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populace considers that science and technology have changed life for the better, only 7 percent consider the change to have been for the worse.

In cases where science and technology are deemed to have caused problems, the public is capable of drawing distinctions in imputing blame. Sixty percent say that government decision-makers are most at fault, 14 percent point the finger at business. Only 5 percent blame scientists directly, and 7 percent blame technologists and engineers.

The public shows considerable confidence in the ability of science and technology to help solve public problems. Asked in which specific areas tax dollars should be spent, respondents rank health care highest, weather control and prediction lowest. Despite confidence in their problem-solving ability, a sizable minority of the public would like to see social control over science and technology increased. A plurality of 45 percent say the degree of control should remain as it is, and 10 percent that control should decrease.

Very similar results are reported by a survey undertaken for the Commission of the European Communities.† Sixty-nine percent of people in nine European countries consider science to be "one of the most important factors in the improvement of our daily life."

Like Americans, Europeans place highest priority on medical research; agricultural research comes second and pollution control third. Europeans overwhelmingly favor the idea that their states should pool their scientific research effort, only 14 percent favoring separate national research programs.

Results were consistent from country to country except for the German public, whose attitudes toward science were consistently dourer.

"The main surprise—and this must be stressed—no doubt lies in the extremely strong and widespread consensus in favour of science," note the commission's reporters. "There is no crisis of confidence in science among the general public of Europe."

†*Science and European Public Opinion*. Commission of the European Communities. Rue de la Loi 200, B-1049, Brussels, Belgium.

Britons Are Nobeler, Americans Nobelest

Nobel prizes may not be the best comparative index of scientific prowess among nations, but none is perfect. Statistics* compiled by the National Science Foundation show that Germany, the United Kingdom, and the United States have dominated the field since 1900 but in interestingly different ways.

In proportion to each nation's population, British scientists have won most Nobels in each decade from the 1940's to the present. For the previous 40 years Germans were in this position. Germany's Nobel prize performance fell after 1940 to about half its previous level (for reasons presumably having much to do with the persecution of its Jewish population), and has remained at that level ever since.

In terms of absolute numbers the United States has beaten its two European competitors in each decade since 1940 and in each of the three scientific disciplines for which the prize is awarded.

Nobel Prize laureates in science proportionate to population for selected countries, 1901–1976.

Period*	United States	United Kingdom	West Germany†	France	U.S.S.R.	Switzerland	Netherlands
Average number of Nobel Prizes per 10 million population per year							
1901–1910	.011	.115	.198	.153	.014	.278	.727
1911–1920	.018	.067	.113	.101		.513	.156
1921–1930	.023	.156	.221	.075			.270
1931–1940	.062	.149	.230	.049		.488	.119
1941–1950	.092	.142	.091			.667	
1951–1960	.172	.174	.057		.020		.093
1961–1970	.128	.222	.086	.104	.013		
1971–1976†	.175	.238	.082			.278	
Number of Nobel Prizes awarded							
1901–1910	1	5	12	6	2	1	4
1911–1920	2	3	7	4		2	1
1921–1930	3	7	8	3			2
1931–1940	9	7	9	2		2	1
1941–1950	14	7	4			3	
1951–1960	29	9	3		4		1
1961–1970	25	12	5	5	3		
1971–1976	22	8	3			1	
Total	105	58	51	20	9	9	9

*Presented by location of award-winning research and by date of award. †Includes East Germany before 1946.

As for the Fields Medal, the mathematician's equivalent of the Nobel prize, the United States has garnered 35 percent of medals awarded since 1936, France 20 percent, and the United Kingdom 15 percent.

Nicholas Wade

*Science Indicators 1976. Government Printing Office, Washington, D.C. 20402. $4.75.