



On the Road Again

Much of the engineering behind California's roads can be traced to one of Cal's lesser-known labs.

By Alex Park

AS THE DIRECTOR OF THE PAVEMENT RESEARCH CENTER (PRC) for most of its existence, Carl Monismith '50, M.S. '54, has spent the better part of his career developing materials that are frequently used yet rarely appreciated. "In the United States, we spend about 100 billion dollars on pavements" every year, he says. "But people don't realize how much engineering goes into it."

The PRC began life in 1951 with a massive task. Rapid industrialization necessitated by World War II had left California's highway system a wreck just as the automobile was gaining popularity among American consumers. Through a legislative mandate, the Center was formed at Berkeley to develop materials for a new generation of tougher and longer-lasting roads.

Today the Center, jointly operated by Berkeley and

Davis, is considered one of the foremost research centers of its kind in the world and develops most new pavements used by Caltrans. Inside the Center's lab at the Richmond Field Station, Monismith, who has been a member of the Berkeley faculty for more than 50 years, and a team of 25 researchers seek solutions to every conceivable road-related problem. To reduce noise on congested roads, they experimented with mixtures containing ground-up tires to absorb sound. As the price of oil has ascended, the team have reduced the oil content of asphalt significantly, from 50 percent in 1970 to less than 15 percent now.

In recent years, with California in a fiscal crisis, the PRC has expanded its efforts to develop pavements that would last longer to be more economical in the long term, and is incorporating more reclaimed materials from old roads in its new designs.

Despite the urgency characterizing some projects, developing pavements requires patience and meticulous research. Once a mix is decided on, it's made into specimen tiles for testing in every possible circumstance depending on the intended use—from extreme heat to extreme cold, under stress or compression, and in the rain. Durability (a requisite for all samples) is tested in machines that simulate the impact of 5 million cars—a figure typically achieved in a period of years on a busy highway—in two weeks. Design variations are made, and the pros and cons of the most successful specimens are weighed against each other.

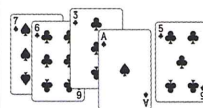
"It's an evolutionary more than a revolutionary science," Monismith says. Revolutionary or not, the research at work at the PRC is ensuring that California will have smooth roads ahead.

would produce more power than slower motions, like walking.



MESO-PUP-TAMIA

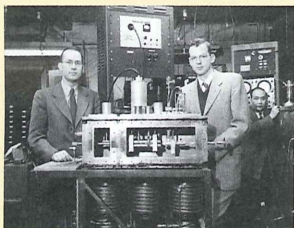
Researchers at UCLA have conducted the most extensive analysis of canine genetics and concluded modern dogs descended from wolves of the Middle East. Previous genetic research had suggested dogs originated from the Far East, a finding that could not be corroborated with archaeological findings. The Middle East, however, is also where agriculture likely first developed, and where cats and livestock were first domesticated, say the researchers, and thus seems a more apt point of origin for man's best friend.



IF ONLY

New research at Berkeley's Haas School of Business suggests that people who engage in "counterfactual thinking"—recalling a crucial moment in their lives and considering alternative outcomes—tend to be more motivated and analytical. Professors **Laura Kray** and **Philip Tetlock** found that this tendency instills some people with a sense that things happen for a reason and refocused others on the positive

Eureka!



Beamish Boy

"Many people, when the LASER came along, said, 'Oh, that's a very cute idea,'" Berkeley professor of physics Charles Townes once recounted. Townes shared the 1964 Nobel Prize in physics for

being the first to describe the LASER and inventing its precursor, the MASER (Microwave Amplification by Stimulation of Emission of Radiation). "It was so new, they didn't know what it could do," he said. In January, Berkeley Lab held a celebration marking the LASER's 50th anniversary, in which Townes recalled the moment of "sudden revelation." He was taking a walk in Franklin Square early one morning in 1951 when he realized how he could make molecules circumvent the laws of thermodynamics. He jotted notes on the back of an envelope, and the MASER was born. The MASER works on the same principles as the more widely

known LASER, which uses photons. "... I could see some applications [for the LASER]," he said in an interview. "I couldn't possibly see all of them. You can't ever. Science keeps evolving."

Mass Appeal

In 2005, harpsichordist and Berkeley musicology professor Davitt Moroney rediscovered a mass by composer Alessandro Striggio that had been missing for nearly 280 years. The piece, *Missa sopra Ecco si beato giorno*, is an elaborate choral work of 40 voice parts, with a final movement of 60 voices—the largest known in Western music. It was composed around 1565 and gifted to the Holy Roman Emperor, and it went missing in 1726. In 1987 Moroney found hints that it was housed at the Bibliothèque Nationale de France in Paris. For the next 20 years he regularly visited the library, poring through texts and letters, finally finding a reproduction of the work that had been mislabeled several times over the centuries. Moroney transcribed the mass into modern musical notation and in 2007 conducted it for the BBC Singers and the Tallis Scholars in London's Royal Albert Hall.