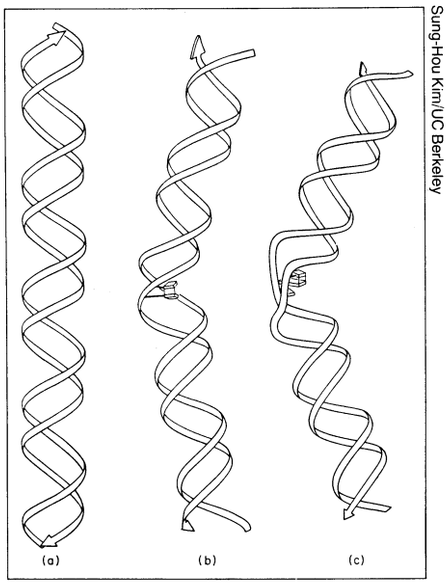
nucleic-acid base on each of two strands of DNA. If this psoralen cross-link is not repaired, the affected cell will die.

Scientists believe that the DNA repair mechanism must recognize the structural changes these damaging chemical bonds cause. "Our goal was to see what kinds of changes in the overall DNA structure are induced by this photo-damage," says Stephen R. Holbrook, a staff scientist at Lawrence Berkeley Laboratory, "and our results are that the DNA becomes bent [at the site of damage] by a moderate angle in the thymine dimer formation, and by a very large angle in the psoralen cross-link." David Pearlman at the University of California at Berkeley computed the helical kinks, or bend angle, induced in the DNA as 27° for the dimer and 46.5° for the psoralen cross-link (shown in the illustration as b and c, respectively).



Sung-Hou Kim/UC Berkeley

Healthy, linear DNA (a) shown with dimer (b) and psoralen cross-linked (c) models.

The researchers also noted a characteristic alteration in the helical coiling of the double-strand DNA at the point of damage. Normal DNA has 10 base pairs per full turn, meaning that DNA turns 36 degrees for every base pair. In the damaged DNA, the chemists' models showed a change in that winding angle. For dimers, instead of winding 36°, affected base pairs coiled only 16.3°. In the psoralen cross-link, the 87.7° twist in the opposite direction actually causes the affected portion of the helix to completely unwind (structure c).

"I should emphasize," Holbrook says, "that this is a proposal." Although the contortions were suggested by computer models based on the best available X-ray crystallographic data on dimer and cross-link DNA damage, he notes that they have not yet been visually observed. Milan Tomic, a student now working with the team, is attempting to isolate enough psoralen-linked base pairs to make that possible.

— J. Raloff

Out of the pork barrel, into the fire

"A million dollars here, a million there, and soon it begins to add up to real money." This political chestnut — a favorite quote at budget time — can readily be applied to recent concerns about the success some universities have had in obtaining federal funds for the construction of new facilities. During the last two years, about two dozen universities have together collected more than $100 million for new buildings by going directly to Congress and lobbying for special appropriations.

"These actions establish a dangerous precedent," says a new report from the National Science Board's (NSB) Committee on Excellence in Science and Engineering. "If this becomes common practice, it could seriously undermine the U.S. system of merit competition for research funding that has been so successful during the recent period of U.S. scientific dominance."

The furor started two years ago when Columbia University in New York and Catholic University of America in Washington, D.C., hired Schlossberg-Cassidy and Associates, a Washington lobbying firm, to help them get funding for new laboratories. The effort was successful, bringing $8 million to Columbia and $13.9 million to Catholic University (SN: 7/23/83, p. 52).

Because of this success, says NSB Chairman Roland W. Schmitt, "there's enormous pressure on other university presidents, who also have an intense need, to go and do likewise. I think there's a danger of the dam bursting."

The NSB report lists 15 universities that have already benefited from bringing their problems directly to Congress. For example, Florida State University in Tallahassee, which happens to sit in the district of Rep. Don Fuqua (D-Fla.), chairman of the House science and technology committee, obtained $7 million to establish a supercomputer center. Northwestern University in Evanston, Ill., received $16 million to build a "basic industry" research institute. In addition to these 15 schools, another seven institutions received funds for libraries or demonstration projects.

The problem, says Charles E. Hess of the University of California at Davis, who chaired the NSB committee, is that many of these proposals were brought up late in the budget process on the House floor and were approved without any discussion. "To me, you're not only bypassing science review, but essentially you're bypassing all review," he says.

Theodore Litovitz, director of Catholic University's Vitreous State Laboratory, doesn't understand why there is such a fuss. "The money is for a building, not for research," he argues. "There are so many other buildings that have gone up based on government funds. Buildings have never been peer-reviewed."

"The reason why it's such a large issue," says Robert M. Rosenzweig, president of the Association of American Universities (AAU) in Washington, D.C., "is that it can't be limited to facilities. The same pressures that lead to the targeting of a building will eventually spill over into decisions about what research is going to be supported in that building." In late 1983, the AAU along with the National Academy of Sciences issued statements condemning "special-interest amendments to funding legislation" (SN: 11/19/83, p. 329).

In addition, money intended for other purposes may go into building facilities. Such reallocations have already taken some funds, especially at the Department of Energy, away from research projects, says Rosenzweig.

In the late 1960s and early '70s, the National Science Foundation (NSF) did provide funds for building or renovating research facilities, Hess points out. Now, NSF has new programs for supercomputer (SN: 3/2/85, p. 135) and engineering research centers (SN: 2/16/85, p. 102). But this isn't enough.

"The present spurt of direct appeals for congressional action on academic projects," says the NSB report, "is symptomatic of an underlying need in many U.S. academic institutions for facilities support. This need is not adequately addressed by present funding mechanisms in either the public or the private sector."

"Until there's some regular funding for renovation and construction of facilities," says Rosenzweig, "the temptation to use the direct congressional route is going to be too great for some to resist."

The report recommends the holding of a special conference as soon as possible to consider these issues. "This conference is to be a catalyst," says Schmitt. It will bring together university administrators, researchers, people from the financial community, state and federal officials and others to share ideas and to map out a strategy for meeting university needs. "The solution cannot be a federal solution alone," says Schmitt. Planning for the conference, which may take place as early as next summer, is just beginning.

Meanwhile, Congress is scrutinizing the federal budget for the fiscal year 1986. There are already a significant number of university requests for special appropriations, says one congressional committee staff member.

"It's hard to know how many," says Rosenzweig. "It's in the nature of these things that they don't happen until late in the budget process."

— I. Peterson