showed recently that bispecific immunoglobins produced from quadromas improve sensitivity and signal-to-noise ratio over conventional immunoassays, and they simplify staining procedures (*Proc. Natl. Acad. Sci USA* **83**:7989–7993, 1986). Cuello says bispecific antibodies' most immediate application could be to provide "one-step" immunodiagnostic procedures. RMAs could eliminate the need for double-antibody "sandwich immunoassays" (patented by Hybritech, San Diego, CA), where one antibody is used to bind to the target and a second provides the detection signal. "In a single operation," he says, "you could detect an antigen and even quantitate." Also, by using different markers on varying bifunctional antibodies, researchers could detect multiple antigens at the same time, while avoiding interferences caused by conventional multiple-antibody detection schemes. In addition, the approach could be used in purification, where one arm of the antibody binds to the support matrix and the other captures the desired substance.

Cuello stresses that quadroma technology can also aid research. Although normal multiple-antibody techniques work well for detecting surface antigens, these complexes have difficulty penetrating the cell to search for intracellular antigens. This means that scientists must first distort the specimen by breaking up the cell. A bispecific antibody bound simply to one peroxidase detector molecule, however, is small enough to penetrate the cell and localize internal antigens. In fact, Cuello has shown that these small complexes distribute evenly across a 50μm section. "When you use bispecifics," he concludes, "you compromise very little."

Cuello, who consults for a newly formed company called Medicorp (Montreal), reports that his group has filed several patents on various applications of bispecific monoclonals. Elliott Block, Medicorp's president, says the firm's interest is in the "development of *in vitro* diagnostics and therapeutics using hybridoma technology" and that quadromas could play a role in this strategy. Medicorp is soon to move into Montreal's new Biotechnology Research Institute.

"We now see the bifunctional technology as an enabling technology to develop an automated system," says Jayson D. Pankin, founder and chairman of Polycell. Toward this end, Polycell's parent company, Quest Biotechnology (Detroit, MI), recently purchased bankrupt American Monitor Corp. (Indianapolis, IN). Specializing in computerized, automated blood chemistry testing equipment, American Monitor will provide the expertise needed to develop an automated immunoassay processor, taking advantage of the capability of bifunctional antibodies to bind target and at the same time carry a detection molecule. Pankin predicts development of this equipment should take about two years.

Quest's business organization is interesting as well. Formed in February 1986 as a holding company to acquire and develop new healthcare technologies, it raised about $3 million in its initial public offering last summer. According to Pankin, who also serves as vice president of Quest, the new firm runs its acquisitions as "projects" under Quest's management team, thereby conserving funds that would have previously gone to each individual management staff. Quest's first purchase was to buy 95 percent of Polycell; Johnson & Johnson owns the rest of Polycell. Quest's other interest so far has been in the field of blood substitute technology.

—Arthur Klausner

RESEARCH FUNDING

MODEST INCREASES FOR FEDERAL BIOTECH R&D

WASHINGTON, D.C.—Incremental changes for biotechnology research support are embedded in the Administration's budget for fiscal year (FY) 1988, but teasing out precise figures for particular federal programs has proved difficult. Nonetheless, a few bright spots for biotechnology stand out already.

Prominent among new biotechnology programs is a proposed $10-million plant sciences initiative jointly sponsored by the National Science Foundation (NSF), the Department of Energy, and the Department of Agriculture (USDA). "This initiative will focus on the application of modern techniques in cellular and molecular biology to plants, and it will involve the establishment of multidisciplinary basic and training centers at academic institutions with industrial, other private sector, and local and state government participation," notes William R. Graham, the President's science adviser and director of the Office of Science and Technology Policy.

Biotechnology and other university-based, multidisciplinary centers also are a major theme in NSF's 1988 budget proposal. According to agency director Erich Bloch, several such projects are proposed within NSF's "Centers and Groups" budget, which is set at $529 million for FY 1988, an increase of 18 percent over the previous year. The biological, behavioral, and social science component within the overall NSF budget of $1.6 billion is increasing in 1988 also—by 16 percent, to $297 million.

Total USDA research spending, including internal Agricultural Research Service (ARS) and external Cooperative State Research Service (CSRS) budgets, will decrease by $52 million from 1987 levels to $782.8 million in 1988. Because of shifts of funds from non-research programs, however, the ARS research budget is slated to increase by $24 million, and includes $6.9 million for a plant germplasm program and $2.1 million for animal productivity research. The competitive research grants program within CSRS will rise modestly over 1987 levels, continuing its new biotechnology program at the same level as 1987: $19 million. USDA's Animal and Plant Health Inspection Service has been allotted $4 million in the 1988 budget for biotechnology surveillance and regulatory purposes.

Although the National Institutes of Health (NIH) sponsors the most federal biotechnology research, its officials shy away from classifying NIH efforts this way. Acceding to requests by Congress, however, NIH now identifies the biotechnology portions of its total research budget that fall into two general categories: research closely related to biotechnology and research contributing to its underlying scientific base. In 1988, the budgets for these two categories are slated to rise modestly to $708 million and $1.277 billion, respectively.

NIH's overall 1988 budget has more than its customary share of kinks. The Administration proposes to hold over $334 million in 1987-appropriated funds until 1988, bringing the total to $5.8 billion and possibly cutting the number of new research grants to levels below that acceptable to Congress. The Administration also is calling for $534 million in funding for AIDS research and education programs next year, a 28 percent increase over 1987.

—Jeffrey L. Fox