

## Science, technology achievements honored

Three chemists and a chemical engineer were recipients of four of nine 1998 National Medals of Science announced by President Bill Clinton last week. A team award to Monsanto and company awards to Biogen and Bristol-Myers Squibb account for three of five 1998 National Medal of Technology awards announced at the same time. The medals are the U.S.'s highest commendation for scientific and technological achievements.

These medal of science winners are "superstars in their respective fields," commented National Science Foundation Director Rita R. Colwell. "They've contributed a lifetime of stunning discoveries."



Cahn



Ruckenstein

Among those "superstars" are the following:

- Bruce N. Ames, professor of biochemistry and molecular biology at the University of California, Berkeley, and director of the National Institute of Environmental Health Science, for changing the direction of basic and applied research on cell mutation, cancer, and aging.

- John W. Cahn, fellow at the National Institute of Standards & Technology, Gaithersburg, Md., for his profound influence on the course of materials and mathematics research and his enormous contributions to three generations of materials scientists, solid-state physicists, and mathematicians.

- Eli Ruckenstein, professor of chemical engineering, State University of New York, Buffalo, for his world-class pioneering theories and experimental achievements in colloidal and surface phenomena, catalysts, and advanced materials.

- George M. Whitesides, professor of



Whitesides

chemistry, Harvard University, for his innovative and far-ranging research in chemistry, biology, biochemistry, and materials science that has brought breakthroughs to transition-metal chemistry, heterogeneous reactions, organic surface chemistry, and enzyme-mediated synthesis.

Congratulating the technology medal winners, Commerce Secretary William M. Daley said: "It is through the vision and achievements of innovators such as these five medalists that the U.S. is able to enjoy economic growth and a high standard of living. Their efforts have created jobs and better goods and services."

The Monsanto team of Robert T. Fraley, Robert B. Horsch, Ernest G. Jaworski, and Stephen G. Rogers is recognized for pioneering achievements in plant biology and agricultural biotechnology and in global leadership in the development and commercialization of genetically modified crops. Biogen, Cambridge, Mass., is recognized for its leadership in applying breakthroughs in biology to the development of life-saving and life-enhancing pharmaceuticals. Bristol-Myers Squibb receives a medal for extending and enhancing human life through innovative pharmaceutical R&D and for redefining the science of clinical study.

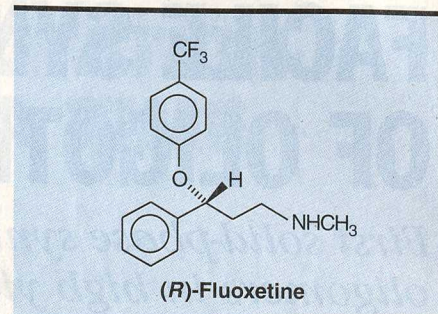
Janice Long

## Eli Lilly moves to protect lucrative Prozac franchise

Drugmakers Eli Lilly & Co., Indianapolis, and Sepracor Inc., Marlborough, Mass., have inked a \$90 million licensing agreement that gives Lilly exclusive rights to develop and market Sepracor's (*R*)-fluoxetine, the active single isomer of Lilly's blockbuster drug Prozac (racemic fluoxetine) used for the treatment of depression.

Lilly, which holds the patents on racemic fluoxetine, hopes the pact will protect its nearly \$3 billion Prozac franchise from fierce generic competition once its patents expire in 2003. By licensing Sepracor's (*R*)-fluoxetine, Lilly says its aim is to extend its Prozac-based franchise to 2015, at which time Sepracor's patents on (*R*)-fluoxetine will expire.

Terms of the agreement specify that Sepracor will receive an up-front milestone payment and license fee of \$20 million and up to \$70 million in additional milestone payments, based on the progression of (*R*)-fluoxetine through devel-



opment. If (*R*)-fluoxetine clears regulatory approval, Sepracor also stands to earn royalties on sales.

In return, Lilly obtains exclusive worldwide rights to (*R*)-fluoxetine for all indications and uses and will assume responsibility for all subsequent development work, including clinical trials, regulatory submissions, product manufacturing, and marketing.

"Prozac is a big franchise for Lilly and it behooves them to cover their bases," says Michael Tong, a pharmaceutical analyst at brokerage firm Salomon Smith Barney, New York City. "Lilly essentially bought an option on the future of its depression franchise by writing a \$20 million check."

The deal allows Sepracor to benefit from sales of (*R*)-fluoxetine before Lilly's patents covering racemic fluoxetine expire. Sepracor is a specialty pharmaceutical company that develops and commercializes single-isomer or active-metabolite versions of other companies' leading drugs (C&EN, Nov. 30, page 11). Had Sepracor signed with another company, or developed (*R*)-fluoxetine on its own, it would have had to wait until after Lilly's patents expire before being able to market the drug.

"While Lilly's patents [on racemic fluoxetine] are in force, we estimate Sepracor will receive royalties in the high single digits. Maybe 7 to 8%," Tong says. "When Lilly's patents expire and Sepracor's patents are dominant, royalties could climb to 12 to 13%."

Although the agreement seems solid, Tong says there are some hurdles facing both partners. The biggest will be showing a significant therapeutic benefit for (*R*)-fluoxetine over racemic fluoxetine, which will be necessary to stave off generic competition once Lilly's patents expire.

The partners hope that by separating the (*R*)-fluoxetine isomer from the (*S*)-fluoxetine isomer, they will have a safer, more effective drug. The long physiological half-life of Prozac is one of the side effects the partners hope to eliminate.

Ronald Rogers