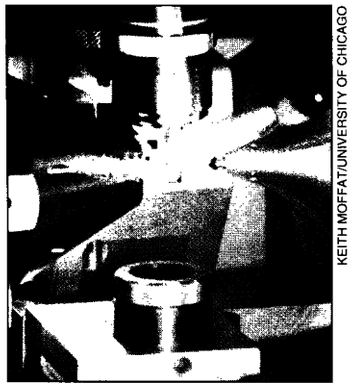
out to be surprisingly difficult. The main stumbling block has been finding a way to prompt the 10^{13} or so molecules in a typical protein crystal to initiate their moves in concert, so that the snapshot isn't blurred by molecules that are responding out of step.

The problem is that the two standard reaction triggers—a chemical diffused into the crystal or a flash of light from a laser—can both produce an uneven spatial gradient in the crystal, says Moffat. The result is that instead of taking place at the same instant throughout the crystal, the reaction sweeps through it like a "roll of thunder," as he puts it, blurring the individual snapshots of enzyme structure. And while a very bright laser pulse can initiate the reaction simultaneously all through the crystal, it does so at the risk of damaging the crystal structure.



KEITH MOFFAT/UNIVERSITY OF CHICAGO

Movie set. A protein crystal is bombarded with blue laser light to initiate a reaction, white light to monitor the reaction's progress, and invisible x-rays to capture images.

As a result, the Laue technique so far has only succeeded on reactions that are slow to begin with. In 1987, Louise Johnson and Janos Hajdu at Oxford University managed to take time-resolved x-ray crystallography frames of phosphorylase, a huge molecule that takes tens of minutes to hours to convert a stubborn substrate into a product. And in 1991, Sweet and his colleagues at Brookhaven studied the enzyme trypsin, a digestive enzyme that breaks down proteins by hydrolyzing them—encouraging them to react with water.

But Moffat thinks the technology for moving on to faster reactions may now be in hand. The key may be a device called a microspectrophotometer, which measures a crystal's optical absorption spectrum at the same time as it is being hit by x-rays. By doing so, the device can reveal when and where the reaction is under way. That should enable researchers to deliver a jolt of laser light just strong enough to start the reaction uniformly, without running the risk of damage. "We can measure just how much energy is put in, and can put in just enough to trigger the reaction but not so much as to damage the crystal," Moffat explains.

In studies of a light-sensitive protein known as photoactive yellow protein (PYP), which acts as a bacterial photoreceptor, he and Elizabeth Getzoff of the Scripps Research Institute are testing that promise. They've taken multiple, time-resolved frames of PYP as it responds to light. The work is in progress, and none of the researchers will say much about it. But as Louise Johnson says, "if the PYP work can be pulled off, it would be very exciting." She adds that it might be "the breakthrough" the field has been waiting for.

If that's the case, the field will have a lot to look forward to in the next few years. Three powerful new synchrotron sources are coming on line: the European Synchrotron Radiation Facility in Grenoble, France, which has just begun producing light, and the Advanced Photon Source at Argonne National Laboratory and SPring-8 in Tsukuba, Japan, both scheduled to turn on within 3 years. These machines will provide x-ray crystallographers with brighter, tighter beams, says Moffat, and "enable us to study even faster reactions." Crystallographers may be about to discover what Hollywood discovered long ago—that there's nothing like action to draw the crowds.

–Gary Taubes

BIOLOGY AWARDS

Ernst Mayr Wins the Japan Prize

When the Nobel committee makes its annual wake-up calls to scientists to tell them they have won science's top prize, researchers in most areas of biology don't lose any sleep. There are no Nobel Prizes for biology other than medicine and physiology. As a result, some of the greatest biologists of the 20th century have no chance of making the trip to Stockholm. One of the most renowned, however, this week garnered an award designed to make up for this oversight: Evolutionary biologist Ernst Mayr was given the prestigious Japan Prize by the Committee on the International Prize for Biology.

Mayr, age 90, is the Alexander Agassiz Professor of Zoology, Emeritus, at Harvard University, and was recognized for his groundbreaking work in systematics: defining the evolutionary relationships among organisms. Other scientists are applauding his selection. Evolutionary biologist John Maynard Smith of the University of Sussex says that "Ernst is one of the great shining figures in evolutionary biology." Then he asked: "Did he win a lot of money? I like to see my friends get a lovely nest egg."

In fact, Mayr will walk away with $100,000 and a medal at an awards ceremony with the Japanese emperor in Tokyo on 28 November. Reached at his home in Cambridge, Massachusetts, Mayr obviously relishes the recognition: "Some years ago, I was picked as the world's best evolutionary biologist for the Balzan Prize. Now, I've been picked as the world's best systematist. It's rather gratifying."

ANNETTE COLTRELL

Prize in hand. Biologist Ernst Mayr's work on classifying birds was the foundation for a brilliant career.

Indeed, the award was given to Mayr because he was "without a doubt, the outstanding systematist in the world," says Columbia University systematist Walter Bock, who was a member of the 17-member committee that selected Mayr. Ever since Mayr left his native Germany at the age of 23, sailing to the Southwest Pacific to study the wild birds of New Guinea and the Solomon Islands, he has been devising methods of classifying species and subspecies of organisms. His observations of birds in the wild, and his work as a curator in charge of bird collections at the American Museum of Natural History for 21 years, led to the publication of the leading textbook on systematics, *Systematics and the Origin of Species* (1942).

The prize committee also took note of Mayr's other scientific contributions. He is best known as one of the architects of the so-called "modern synthesis" of evolutionary biology, which showed in the 1930s to 1950s that Darwin's notion of natural selection could be used to explain all evolution—not only the way plants and animals change over time, but why genes evolve at the molecular level. In particular, Mayr cleared up an area that had confused Darwin—how new species arise. Says Smith: "His chief observation is that species arise when the members of a species are separated in space and time"—either by mountains, the sea (particularly if they live on islands), dense forests, or other geographical barriers. Over time, separate populations of the same species evolve different traits—so-called "isolating mechanisms"—that discourage them from interbreeding, and eventually become so different genetically that they form different species. For this insight and others, Mayr too, as his peers and prize committees agree, has shown himself to be a breed apart.

–Ann Gibbons