Red-flashing fish have chlorophyll eyes

A fish that uses a form of plants' green magic to see provides the first documented case of a chlorophyll playing a physiological role in an animal.

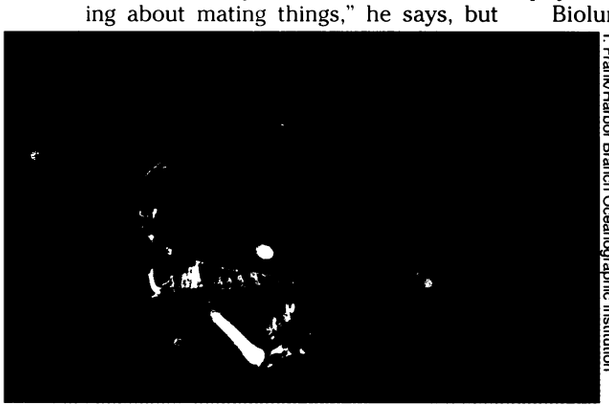
The eyes of a fish called a loose jaw, or dragon fish, contain a derivative of chlorophyll, reports a research team from England and Finland. The compound endows *Malacosteus niger* with the rare power of seeing far-red light, the team says in the June 4 NATURE.

Since most deep-sea creatures see only blues, the compound gives loose jaws a secret weapon. They pulse a far-red light that illuminates prey, but victims don't know they've been caught in the glare. "It's a bit like an army sniper scope," says coauthor Julian C. Partridge of the University of Bristol in England.

"I'm sure they use it for communicating about mating things," he says, but cautions that researchers in submersible craft have difficulty studying life 500 to 1,500 meters down, where loose jaws prowl. "Any behavior you see is going to be abnormal because you're crashing around with whizzy motors and flashing lights," Partridge says.

Researchers have known that loose jaws are among the rare fish that glow—and see—red as well as blue, but only now have they identified the red-vision chemicals. The team studied the response to light of extracts from loose jaws' eyes and found that one type of pigment absorbs reds and then somehow excites the eyes' other light-detecting pigments. Studying various spectra of the red-catching pigments, the team identified them as modified chlorophylls.

Bioluminescence specialist Edith A. Widder from Harbor Branch Oceanographic Institution in Fort Pierce, Fla., points out that the loose jaw's eye chemistry differs from that of a closely related species that flashes red. She says bioluminescence has probably evolved nearly 30 times. —*S. Milius*



T. Frank/Harbor Branch Oceanographic Institution

Red flashes that its victims can't see come from head spots on the loose jaw, a deep-sea predator that can grow to about 25 centimeters long.

Survey finds wide resistance to TB drugs

It's been said that people are smart but bacteria are smarter.

That adage is bolstered by a new study revealing that the tuberculosis bacterium has developed widespread resistance to the most commonly used anti-tuberculosis drugs, outwitting human-made antibiotics at least some of the time in all 35 countries sampled.

The 4-year study, led by the World Health Organization, shows that of people who had been treated for tuberculosis for less than a month, 36 percent harbored microbes that resisted at least one of the four main anti-tuberculosis drugs. Moreover, 10 percent of infected people who had never been treated for the disease carried a strain of *Mycobacterium tuberculosis* that resisted at least one drug, researchers report in the June 4 NEW ENGLAND JOURNAL OF MEDICINE. Resistance to more than one drug showed up in 13 percent of the treated people and in 1.4 percent of untreated people.

Although few patients were resistant to all four drugs, the findings suggest great risk, says Leonid Heifets of the National Jewish Medical and Research Center in Denver.

Doctors usually treat the disease with all four main drugs for 2 months, then continue with two of them for 4 more months, Heifets says. Many patients, however, don't take medication long enough to knock out the bacteria. "People feel better after a month of treatment" and stop taking the pills, says study coauthor Ariel Pablos-Méndez of Columbia University. Meanwhile, bacteria that mutated in the presence of the drugs may survive when treatment is interrupted. When patients suffer a relapse, they unleash mutated bacteria that are resistant to one or more of the drugs.

This study suggests that many people develop resistant microbes during the last 4 months of treatment and are incompletely cured after 6 months, Heifets says.

Heifets calls the study "a very impressive undertaking. . . . It's an eye-opener."

The researchers examined dates from more than 45,000 people with tuberculosis in Europe, Africa, the Americas, the Western Pacific, and Southeast Asia. Resistance proved strongest in Latvia, Estonia, Sierra Leone, the Dominican Republic, Argentina, Thailand, Bolivia, Vietnam, and a region of Russia east of Moscow. —*N. Seppa*

New spermicides stop cells gently

A promising new class of spermicides has the potential to perform better, and with fewer drawbacks, than those available today.

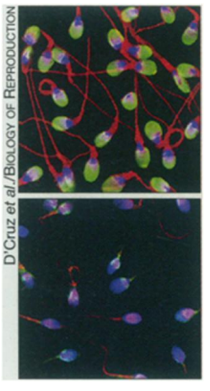
Researchers at the Wayne Hughes Institute in Roseville, Minn., have found that in test-tube experiments, organic vanadium compounds inactivate sperm more quickly than the common spermicide nonoxynol-9. "A 15-second exposure will knock [sperm] out completely," says Osmond J. D'Cruz. Moreover, the compounds work at lower concentrations and may avoid the problems that currently accompany repeated spermicide use.

Spermicides such as nonoxynol-9 are "basically detergents," says D'Cruz. They immobilize sperm by washing away their outer membranes. However, these spermicides also destroy the membranes of other cells, thus damaging the lining of the vagina. Nonoxynol-9 kills beneficial bacteria in the vagina, allowing bacteria that cause urinary tract infections to thrive (SN: 9/14/96, p. 165).

The vanadium compounds, on the other hand, stop sperm by shutting down the motors that turn their whip-like tails. Using a microscope, the researchers could see that the compounds leave a sperm's outer membranes undisturbed, suggesting that they won't disrupt other cell membranes either, says D'Cruz. He and his colleagues Phalguni Ghosh and Fatih M. Uckun report their findings in the June BIOLOGY OF REPRODUCTION.

The team discovered vanadium's spermicidal properties while searching for alternatives to a platinum-based drug used to treat testicular cancer. Knowing that the drug interferes with sperm production, D'Cruz and his colleagues decided to investigate the spermicidal properties of various organic metal compounds. They found that compounds containing titanium, zirconium, molybdenum, or hafnium did not inactivate sperm, but 12 vanadium compounds did.

The team is now testing vanadium compounds in animals. Henry Gabelnick of the Contraceptive Research and Development Program in Arlington, Va., points out that many spermicides are now being developed, including some that show antimicrobial action.—*C. Wu*



D'Cruz *et al.*/BIOLOGY OF REPRODUCTION

Sperm treated with a vanadium compound (top) retain their outer membrane (green). Sperm treated with nonoxynol-9 (bottom) have lost that membrane.