

## Energy-saving sex in the dark abyss

The anglerfish inhabits one of the earth's most difficult niches—the cold, dark pressured depths of the oceans. This fish is a living biology lesson in evolutionary adaptation—its body form is designed perfectly for survival in the abyss.

The female, researchers have discovered over the past 50 years, has attached to her head a luminescent “lure” on a living flexible stalk with which she entices smaller fish too near her gaping, ragged jaws. The males have evolved into dwarfed, reproductive parasites. They attach themselves securely to the females' sides with pincher teeth and there, degenerate into little more than living testes receptacles. The male and females' skins merge, the circulatory systems unite and they become, essentially, single hermaphroditic organisms, existing at a lowered energy state than two separate organisms would need in a dark world where food is scarce.

The recent discovery of two unusual anglerfish specimens has led Theodore W. Pietsch of the Harvard Museum of Comparative Zoology to postulate another unique anglerfish evolutionary adaptation. It had been thought that males only parasitize large, sexually mature females. But Pietsch reports in the July 3 *NATURE* two female-male “units” in which the female is sexually immature and much smaller relative to the male than the other previously collected specimens. This new finding, Pietsch says, means that gonadal development and sexual maturity of both sexes may be dependent on the parasitic attachment. (No free-living males with developed testes have been found, and no free-living gravid females.) The newly found, small, sexually immature females show that attachment may necessarily precede sexual development.

This adaptation makes perfect energy-saving, adaptive biological sense. It is hard enough for anglerfish to find each other (and food) in the inky abyss. Each chance meeting of a male and female is, with this system, made into a “potentially sexual affair,” Pietsch says.

## Searchlight on bird-airplane crashes

Plane crashes are for the birds, particularly when they're caused by birds—an ironic collision between pre- and post-technological flight. While the total impact of natural flight on mechanical flight is unknown, the U.S. Air Force estimates that in 1973 its aircraft collided with birds at least 327 times, killing two pilots and costing \$32,000 per collision.

A team of biologists from Rockefeller University and the State University of New York at Stony Brook, headed by Ronald P. Larkin, have completed a study on the behavior of birds that find themselves suddenly in the flight paths of oncoming airplanes. They report this behavior in the June *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES* along with recommendations for a warning system that could help prevent future bird-aircraft collisions.

Night migrators—a substantial percentage of American bird species—are known to shift to evasive flight maneuvers in order to avoid oncoming aircraft. Planes flying through flocks of migrating birds—a situation in which hundreds of collisions per hour would be expected—often collide with few, if any. The planes, one can assume, are flying in fast, straight lines. The birds, therefore, must be getting out of the way.

The New York team studied the effects of strong light on night migrators. They tracked birds' evasive flight patterns with a radar-mounted searchlight and with a radar tracked Piper Comanche with its landing lights shining continually. Almost all the migrators were able to react to the oncoming lights and dart quickly away.

Sound, as well as light, may be helping to warn the birds,

but aircraft flying at supersonic speeds could not be avoided by means of sound. Birds have sharp vision and visually guided behavior; therefore, “appropriately designed and programmed lights” mounted to shine forward into the “zone of collision hazard,” the team suggests in aviatorese, could give migratory birds enough of a warning to escape their speeding mechanical brothers.

## Sea gulls disoriented by Sanguine

No one is yet sure how birds orient themselves during migration, but several studies show that the magnetic environment may have an effect. This knowledge has generated some concern over the U.S. Navy's proposed Project Sanguine, a giant system that would use low-frequency, long-wavelength radio waves to maintain communication with the U.S. submarine fleet. (Environmental and political concerns have delayed the project for several years.)

An Illinois biologist, William E. Southern of Northern Illinois University at DeKalb, has observed the effects of a Project Sanguine test antenna on the orientation of sea gull chicks. He reports in the July 11 *SCIENCE* that he exposed gull chicks to the high electric and magnetic fields produced at ground level over the north-south buried antenna at the project's Wisconsin Test Facility near Clam Lake, Wis. Two bisecting 22.6-kilometer-long antennas at the Clam Lake site produce test field levels twice as high as the proposed Project Sanguine antennas. Gull chicks in control tests showed directional preferences for flying southeast. But in Southern's 642 trials, they flew off in random directions—clearly disoriented from the jolt of a magnetic field of about 0.6 gauss produced by 260 to 330 amps at 45 and 76 hertz.

It is clear from the tests, Southern says, that the Sanguine antennas are sufficient at ground level to disrupt bird orientation. What remains to be studied, he says, are the long-term effects at or near ground level and the effects on birds migrating naturally at various altitudes and distances from the electromagnetic field source.

## Squirreling away typhus bacteria

Microscopic, rod-shaped rickettsias have made a disproportionately large mark on human history. These infectious bacteria are the casual agents in epidemic typhus, among other diseases, and have caused spates of human misery, from massive epidemics to the downfall of Napoleon's army in 1812. It has been thought for decades that the disease is carried only by man and his body louse. But a team of virologists and a pathologist from the U.S. Food and Drug Administration in Bethesda, Md., now report finding epidemic typhus rickettsias in flying squirrels.

F. Marilyn Bozeman, Steven A. Masiello, Michael S. Williams and Bennett L. Elisberg report in the June 12 *NATURE* a series of laboratory tests which confirm the existence of the rickettsias in flying squirrels collected in wooded areas of Florida and Virginia. They tested the blood sera of more than 200 squirrels. About half showed typhus antibodies. Tissue from the seropositive squirrels was ground and inoculated into eggs. Rickettsias developed in the yolk sacs of these eggs, and mice inoculated with yolk sac suspensions died as a result of rickettsial toxin.

No case of human epidemic typhus has been reported in the eastern United States since 1836. But this new finding, the team states, suggests that a reservoir of epidemic typhus can exist in a wild rodent species independent of outbreaks of the disease. Potential rickettsial vectors (ticks, fleas, mites, etc.) in the squirrel population must be studied, a team member says.