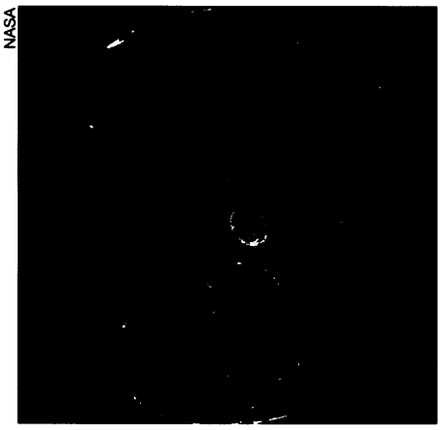
the poles, they collide with local atoms, generating the eerie auroral glow.

In visible light, auroras reveal themselves only over the nightside part of Earth. On the dayside, the glare of sunlight overwhelms their faint glow. POLAR, however, can view the dayside and nightside of an aurora simultaneously in both the ultraviolet and X rays.

The ultraviolet images demonstrate that the dayside and nightside of an aurora can vary from one another in both intensity and shape. "Each has a mind of its own," says George E. Parks, principal investigator of POLAR's ultraviolet imaging study at the University of Washington in Seattle. The differences, he notes, may reflect the fact that the magnetic field on the nightside

NASA



Global X-ray image of Earth's northern aurora, taken by POLAR on March 20. The dashed line marks the boundary between day and night. The picture shows a hot spot above the atmosphere near midnight and a band of weaker X-ray emissions extending through the night and morning hours. Blue depicts the weakest intensity, red the highest.

has a cometlike tail that extends deep into space.

The X-ray images selectively track the motion of high-speed electrons in the solar wind, notes David Chenette of the Lockheed Martin Advanced Technology Center in Palo Alto, Calif., principal investigator of POLAR's ionospheric X-ray imaging experiment. "The X rays provide us with a very solid measure of the power that is [dumped] into the upper atmosphere from these electrons."

By examining Earth's auroras, POLAR tracks disturbances in the solar wind. The craft is part of a fleet of satellites, including the solar observatory SOHO (SN: 5/4/96, p. 277), that collectively studies the interaction between the sun and Earth. The goal of this fleet, explains Mario Acuna of NASA's Goddard Space Flight Center in Greenbelt, Md., "is to be able to predict when and where disturbances [originating from the sun] might occur in [Earth's] magnetosphere and ionosphere and how severe they might be." — *R. Cowen*

Finding some quiet time for reproduction

Algae that spend their days soaking in cool waters off an uninhabited Swedish island offer animals and other plants an important lesson in reproduction. Don't bother trying during turbulent times—wait for your environment to settle down.

Many marine organisms like the alga *Fucus vesiculosus* reproduce by releasing sperm and eggs into the water. These gametes must fuse to grow into a new individual. However, researchers have suspected that this approach to fertilization has a low success rate. In experiments where scientists have released various plant or animal gametes into the ocean, egg and sperm have often failed to meet.

One common type of algae, and probably other forms of marine life, is savvy about reproduction. It determines when the surrounding water becomes calm and only then releases large amounts of eggs and sperm, report Ester A. Serrão of the University of Maine in Orono and her colleagues in the May 28 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

"This paper shows there is at least one elegant mechanism out there," asserts Mark Denny of Stanford University. Some marine organisms, such as sea urchins, just spew out lots of gametes to increase the odds of fertilization.

Serrão and her colleagues collected eggs, sperm, and zygotes from two beds of *F. vesiculosus* off Askö, Sweden, during the 2-month reproductive season. They noticed that the algae released eggs and sperm only in calm water—slower than about 0.2 meter per second—and only in late afternoon. The proportion of gametes to zygotes indicated almost 100 percent fertilization.

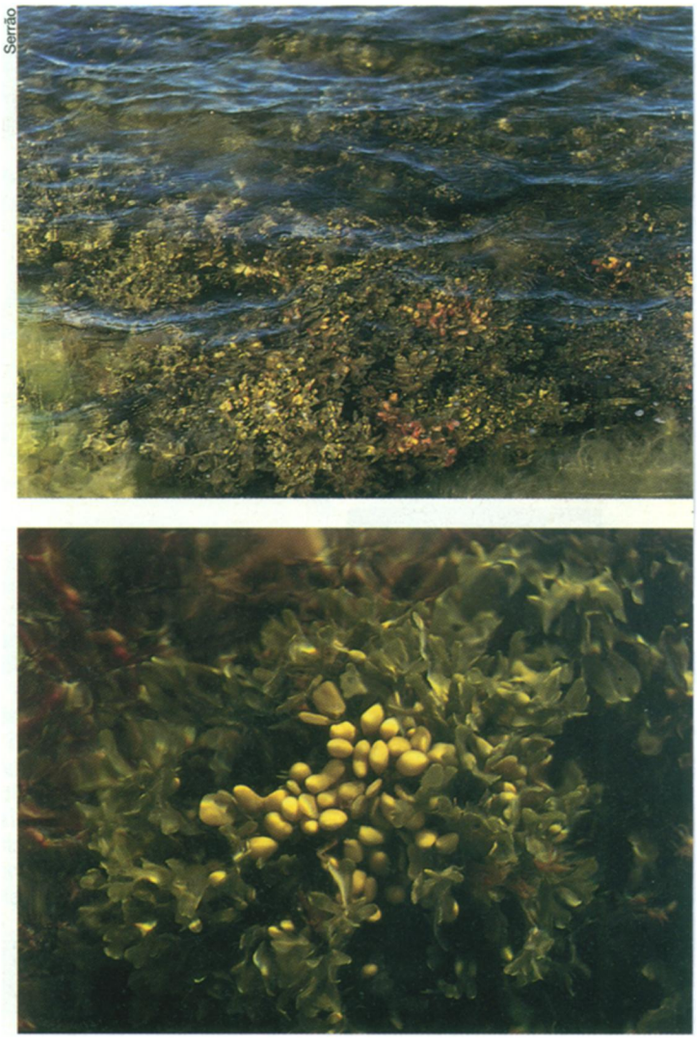
The scientists then put the algae's receptacles, which store either sperm or eggs, in tubes anchored in the ocean. Like intact plants, the receptacles released gametes only in calm water. The researchers found signs of a sperm's nucleus in almost every egg released.

The investigators then measured the response of *F. vesiculosus* and two other algae in the same family to agitation in laboratory water. They put the algae's receptacles in flasks and shook them for various amounts of time up to a week, Serrão explains. The receptacles released their gametes only during the early evening of the day after the shaking stopped. The longer the period of shaking, the more eggs and sperm were released.

These algae appear to be responding to at least one characteristic of calm water—a low concentration of dissolved inorganic carbon, the team learned recently. In quiet water, algal photosynthesis depletes the carbon from the thin layer of static water surrounding the receptacles, and little new carbon mixes in.

When the researchers removed all dissolved carbon from water in the lab, the algae released their gametes, even when the water was turbulent. When the team added carbon, the plants released no gametes, even under calm conditions. — *T. Adler*

Serrão



The alga F. vesiculosus *in the ocean off Sweden. At the end of their branchlike structures, shown close-up, are the receptacles that store gametes (bottom).*