Biology

Calamari choreography

Squid has become a favorite of foodies and fishermen in recent years, as stocks of cod and other marine fish have crashed from overharvesting (SN: 2/22/97, p. 124). Worldwide, the chewy, tentacled cephalopods are the third most lucrative catch from the sea, behind shrimp and tuna.

Squid are generally caught near shore, which is where they breed. To help keep populations thriving, researchers have been studying the squid's reproduction, which involves behavior as strategic as the strutting competitions of many land animals.

Large male squid initiate the main action at dawn. They begin slowly swimming in a large circle about 200 meters across—the length of a couple of football fields, says Roger T. Hanlon of the Marine Biological Laboratory in Woods Hole, Mass. Occasionally thousands, but usually tens or hundreds, of other shimmering squid, both male and female, join in.

Hanlon and his colleagues from South Africa and Canada used radio transmitters to track the movements of eight squid over 2 weeks at a breeding area off South Africa.

The transmitters pinpointed the speed and placement of the squid during the "nuptial dance," the researchers report in the April BIOLOGICAL BULLETIN. "It looks chaotic at first, then you realize they're in pairs," says Hanlon. The circling males pass packets of sperm to females that have been drawn into the swirl.

"It's like a busy airport," says Hanlon. "There's lots of circling going on, with a couple occasionally coming in to land."

Land, in this case, is the seafloor, where the female with her attendant male deposits the fertilized eggs. Whether the dance partner is actually the source of the sperm isn't clear. Smaller "sneaker" males frequently cut in and pass off sperm to paired females; some females also carry sperm from earlier, offshore matings. Hanlon is beginning DNA analyses to determine paternity and whether the circling, sneaking, or offshore-mating tactic is best.

South Africa has begun regulating the catch of squid to preserve the near-shore breeding areas. The United States does not yet, says Hanlon, although fisheries managers are watching for warning signs of decline in the increasingly popular catch. — *C.M.*

M.J. Smale/BIOLOGICAL BULLETIN

A male squid escorts a female to the seabed as she lays her eggs.

Enology genealogy

DNA analysis has solved another question of parentage, this time of a wine. The popular dry, red cabernet sauvignon comes from a grape that is a cross of two other varieties of *Vitis vinifera*, cabernet franc and sauvignon blanc, according to viticulture researchers from the University of California, Davis.

Despite the similarity of the grapes' names, write John E. Bowers and Carole P. Meredith in the May NATURE GENETICS, cabernet sauvignon's genetic link to the sauvignon blanc grape, the source of a light white wine, is a surprise. Yet the researchers' analysis of 30 different genetic markers from the DNA of 51 different grape cultivars—ranging from alicante bouschet to zinfandel—rules out any other possible ancestors except the blanc and the red cabernet franc, which has long been considered a close relation.

The two vines probably grew near each other in the Bordeaux region of France in the 17th century, and a chance cross-pollination led to the new character, the researchers speculate. Cabernet sauvignon is now the world's second most widely planted grape vine for wine. — *C.M.*

Earth Science

Warmth in north pushes spring forward

When viewed from space, the northern end of the globe is looking a tad greener these days. Satellite measurements from 1981 to 1991 have revealed a noticeable increase in vegetation and a lengthening of the growing season, a team of scientists reports. The group attributes the greening to an increase in northern temperatures.

Ranga B. Myneni of Boston University and his colleagues discovered the enhanced plant growth by analyzing data from radiometers flying on weather satellites. The radiometers measure different wavelengths of light reflecting off Earth's surface. Because plants absorb most of the visible light hitting the ground, regions with vegetation reflect far less light than does exposed soil, snow, or water.

Over the 10-year span, areas between 45°N and 70°N showed a 12 percent increase in spring and summer plant growth. At the same time, the annual growing season extended. By 1991, vegetation was appearing about 8 days earlier and remaining green about 4 days later than it had in 1981, report Myneni and his colleagues in the April 17 NATURE. Analysis of more recent data shows that these trends have continued through at least 1994, says Myneni.

The new findings confirm a report last year by Charles D. Keeling of the Scripps Institution of Oceanography in La Jolla, Calif., who collaborated with Myneni on the current study. By tracking carbon dioxide concentrations in the atmosphere, Keeling and his colleagues had detected signs of enhanced photosynthesis in the north, with springtime growth appearing a week earlier than it had previously (SN: 7/13/96, p. 21).

Myneni, Keeling, and their coworkers suggest that warming in the north has triggered the bloom. Large sections of Alaska, northwestern Canada, and northern Europe and Asia have warmed in recent decades, melting snow earlier in the year. The scientists remain unsure why temperatures have climbed. The cause could be a natural change, or it could be greenhouse warming rearing its ugly head, notes Myneni. — *R.M.*

Springtime trouble for Arctic ozone

Chemical pollutants and unusually cool temperatures in the upper atmosphere combined to take a large bite out of the ozone layer above the Arctic early this spring, according to satellite measurements.

This was the lowest springtime ozone measurement seen in the Arctic, says Pawan K. Bhartia of NASA's Goddard Space Flight Center in Greenbelt, Md. He adds, however, that the Arctic ozone destruction never grew severe enough to create a true ozone hole, like the one that appears over Antarctica each year.

Ozone gas forms a diffuse, protective layer in the stratosphere that filters out harmful ultraviolet radiation from the sun. Chlorofluorocarbons and other pollutants in the atmosphere attack ozone molecules around the globe, wreaking the greatest havoc near the poles, where air temperatures are lowest. Cold conditions there trigger the formation of cloud particles that help destroy ozone.

During March, weather patterns from moderate climes normally infiltrate the Arctic and warm the atmosphere, halting ozone loss. This year, however, the Arctic stratosphere remained cold through March. When the first pale rays of sunlight returned to the region after the long, dark winter, the light energized chemical reactions that splinter ozone molecules, says Bhartia. Arctic ozone concentrations for March averaged 40 percent lower than the typical figure.

The period of depressed ozone persisted for only a few weeks before springtime warming melted the clouds and shut down the destructive cycle. "So far, it is not serious. I would not say that there have been alarming levels of ultraviolet radiation reaching the ground," says Bhartia. — *R.M.*