Loving lizards: Sex and unisex species

Courtship and mating behaviors may be more widespread than the mixing of genes by sexual reproduction. "We report for the first time evidence indicating that although unisexual *Cnemidophorus* lizards have dispensed with genetic sex, behavioral sex continues," says David Crews of Harvard University.

At least 27 species of reptiles are made up entirely or almost entirely of females reproducing parthenogenetically, so that each daughter is genetically identical to her mother. Scientists collected members of three such lizard species from Arizona and Colorado and found that pairs of females of these species (but not of closely related sexual species) behave in a manner resembling mating.

The "sexual" behavior of the parthenogenetic females includes courtship and copulatory phases. One animal lunges at another and bites her on the tail, then mounts the back and rides atop for a minute or two, while stroking the back and neck with her jaws and forelimbs and rubbing her cloaca (the female lizard's combined reproductive and excretory opening) against the back. The top lizard grasps the back of the neck or shoulder in her jaws and curves her tail beneath the other's tail to appose the cloacal regions. Finally she shifts her jaw grip further down the body to achieve the contorted mating posture characteristic of that genus of lizard. The females maintain the position 1 to 5 minutes, until the bottom animal breaks away.

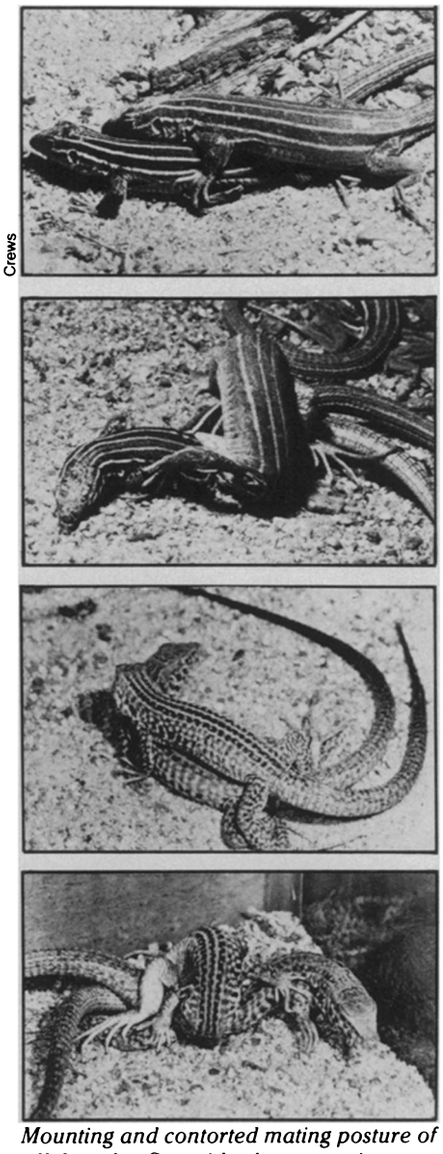
Age and size do not determine the lizards' sexual role. Which female is top and which is bottom is a matter of the ovulatory cycle, Crews and Kevin T. Fitzgerald of the University of Colorado find. In each of 17 pseudo-matings, the more aggressive, courting animal contained only small, undeveloped follicles in her ovaries and was either post-ovulatory or reproductively inactive. The more passive member of the pair always had large, yolky preovulatory follicles, and laid her eggs about 30 days later. Crews and Fitzgerald have seen the same lizard play both sexual roles.

The scientists do not yet know what makes the preovulatory female sexually attractive. Estrogen administered to females at other stages of their cycle does not make them attractive, although the allure may come from an estrogen-progesterone interaction. Crews suspects that chemicals emitted by the preovulatory female play a role, because the lizards have scent pores along their hind legs and inspect each other with much tongue-flicking activity.

The courting behavior seems to be more than a nonfunctional vestige of the lizard species' sexual ancestry. Crews says the behavior primes some hormonal mechanism that regulates the ovaries' activity. Animals caged alone do reproduce, but they lay eggs at longer intervals than do animals raised in groups.

So far the scientists have no idea of the ecological significance of the sexual behavior. The lizards live in large groups in burrows and are fast-moving. "In the wild, we never saw anything other than biting and chasing. We don't know what's going on in those tunnels," Crews says.

In current work, Crews and collaborators are treating the eggs of parthenogenetic lizards with hormones to try to create males. Crews says that they have already had some success in that the gonads of hatchlings of some treated eggs have a male-like duct system. "This could be the most dramatic research," Crews says. In essence they may be turning their lizards from parthenogenesis back to two-sex reproduction. □



Crews

Mounting and contorted mating posture of all-female Cnemidophorus uniparens *(upper photos) closely resemble those of sexual species* C. tigris *(lower photos).*

Ozone depletion: Death to shellfish?

While the earth is expected to lose an estimated 16.5 percent of its ozone layer over the next 100 years (SN: 11/17/79, p. 340), it appears that *current* stratospheric ozone levels may already be dangerously close to damaging certain marine life environments. Scientists at the National Marine Fisheries Laboratory in Manchester, Wash., report that above a certain "threshold level" of exposure to ultraviolet radiation, the survival rates of shrimp and crab larvae decline rapidly.

The experimental threshold of UV-B — the middle portion of the ultraviolet spectrum that is partially filtered out by the ozone — is near the levels that shellfish already experience in their natural environment, according to David Damkaer of the fisheries lab, which is part of the National Oceanic and Atmospheric Administration. Shrimp and crab larvae already are "living close to the thin edge of survival," Damkaer says.

The shellfish larvae generally inhabit ocean surface waters in the late winter and early spring. Although the UV-B radiation reaches its peak in July — when it exceeds the tolerance level determined in the study — NOAA scientists note that UV-B levels are close to or above the danger threshold by the end of the surface season of each species. The effect of ozone depletion, Damkaer and his colleagues suggest, would be to admit more UV-B earlier in the season, shortening the creatures' "safe" time in surface waters.

"Whether or not the populations could endure with a drastically reduced time of near-surface occurrence is not known," Damkaer says. "The way things look, if ultraviolet increases, we're going to see the populations of some species die out. This is serious. And it's dollars and cents to the fishermen of this state and anywhere else where the environment might become inhospitable to shellfish." □

Hopkins heart disease advances

What biomedical advances can a specific amount of money buy? One answer to this rarely posed but eminently practical question was given last week at a science writers' conference at the Johns Hopkins Medical Institutions in Baltimore. Investigators in John Hopkins's cardiology division described some recent advances they have made with $8 million in government and university funds.

- Several years ago Duke University researchers invented two-dimensional ultrasound, which uses high-frequency, pulsed sound to display several areas of

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