zoological sciences

Rank and territorial marking in mice

When ultraviolet light was used to examine urine marks made by adult mice, zoologist Claude Desjardins and fellow researchers at the University of Texas found urination frequency and pattern is determined by social rank.

In the Nov. 30 SCIENCE, they report that dominant males vigorously mark up the entire floor area of their cage, whereas, subordinate males urinate in only two to four pools in the corner of their cage. Subordinate males also hold up to 20 times more urine in their bladder than do dominant males. "It is obvious from the results presented here," writes Desjardins, "that dominant male mice have a distinct social advantage over the subordinate male mice since they assiduously label their environment with an excretory product that has a demonstrated capacity to elicit profound behavioral and physiological effects on the reproductive processes of females."

Hide and seek with chimps

During a recent study on chimpanzees the following questions were raised: "If a chimpanzee has in the past seen the locations of several hidden objects in a field, how does he manage to get to them again, and how does he organize his travel time? What does his iterinary tell us about the nature of his 'cognitive mapping,' his strategy and his criteria of 'efficiency.' "

Psychologist Emil W. Menzel and co-researchers at the State University of New York carried chimpanzees around an outdoor field and showed them randomly placed hidden food. They discovered that when the chimpanzees were allowed to return to the field they could find almost all of the hiding places and remember the type of food hidden in each. The chimps also showed no regard for the pathway they were originally shown by the experimenters, but proceeded to find food by the path of "least distance."

As the chimps consumed more and more food their pace slowed down until eventually they would lie down to rest. On several occasions, the chimps would exhibit sudden recall while asleep. They would suddenly jump to their feet and run straight to a hidden piece of food. When more food was placed on one side of the field than another, the chimps most often went to the side with the most food first. Concludes Menzel in the Nov. 30 SCIENCE: "They proceed on the strategy, Do as well as you can from wherever you are."

Fireflies keep the love-light burning

The synchronous flashing behavior of Asian fireflies was first noted by western naturalists 100 years ago. Entomologist J. E. Lloyd of the University of Florida studies several species of fireflies to determine their mating behavior and the significance of synchronous flashing with their neighbors. In a recent issue of NATURE, Lloyd presents a model for the mating protocol of the insects.

Male and female fireflies gather in bushes and trees that already harbor a number of their own species. They are attracted there by the flash rhythms of the males. Rhythms will vary from species to species. "By synchronizing with his neighbors," Lloyd explains, "a perched male may enhance his probability of obtaining a female because he does not disrupt the species-specific rhythmic pattern and contributes to enhancing the brightness of his locus on the tree."

As females approach, males modify their luminescent behavior thus stimulating the females to land nearby. And as courtship enters into its last stage, nonvisual signals such as pheromones are sometimes used.

earth sciences

Giant buoy weather monitors

One of the hopes for better weather forecasts is to fill gaps in the meteorological record by placing giant scientific buoys at strategic spots in the oceans. There they would record important weather data and transmit it back to land stations. The fifth of a series of such large experimental data buoys is about to be put in place. A Coast Guard cutter this week began towing the 100-ton, 40-foot-diameter buoy EB-13 from Gulfport, Miss., to a site in the Atlantic 300 miles east of Charleston, S.C., where it will be anchored in 2.5 miles of water.

There, just east of the Gulf Stream, it will automatically transmit every three hours information on air and sea temperatures, wind, rain and waves to a shore station in Miami for relay to the National Weather Service headquarters in Maryland. The area where the buoy is being placed frequently generates "Hatteras" lows and severe weather affecting the eastern United States. The information will be used by the Weather Service for daily forecast operations and for winter storm and hurricane forecasts and warnings.

The buoy joins four similar ones already in place off the coasts of the United States: two in the Gulf of Mexico (SN: 6/24/72, p. 407), one in the Gulf of Alaska and one southeast of Norfolk, Va.

The winds of destruction

Weather scientists using an experimental Doppler radar system on storms in Oklahoma have found that it can identify a particular kind of wind circulation that seems to lead to tornadoes.

The radar system detected evidence of winds rotating in a circulation pattern much larger than that of a tornado in nine of many storms scanned. Seven of those storms eventually produced tornadoes. Thus the signature of the larger wind rotation may be a strong sign that a tornado will develop.

Through a computer that processes in real-time 20-million bits of wind-velocity data a second from the radar, the scientists at the National Severe Storms Laboratory were able to learn the nature of the storms while they were happening, rather than at some later time. The hope is that the technique can be developed to improve the quality and timeliness of tornado warnings.

Doppler radar, in contrast to conventional radar, reveals the velocity of winds within a storm.

Volcanoes under surveillance

Of the more than 500 historically active volcanoes in the world only a few may be erupting at any one time. For a variety of reasons, volcanologists have a great need to know when eruptions occur. But routine observations have been financially and logistically possible at only a few major volcanoes.

Now volcanologists have a way around the problem. Fifteen volcanoes in North and Central America are now under continuous surveillance in a prototype system that makes use of ground instruments and an orbiting satellite. In the past two years, 15 volcanoes in Alaska, Hawaii, Washington, California, Guatemala, El Salvador and Nicaragua have been placed under the watchful eyes of inexpensive seismometers and tiltmeters installed there and left to operate automatically. The data from the instruments are being relayed by the ERTS-1 satellite to a U.S. Geological Survey center in Menlo Park, Calif. The system is considered a major advance in volcano monitoring.