Natural Sciences

Brooding over the young

A species of silver gull, found in western Australia, *Larus novaehollandiae* Stephen, has been observed in the field by C. A. Nicholls of the Australia Division of Wildlife Research to produce and rear two broods of chicks in the same year. Nicholls reports in AUSTRALIAN JOURNAL OF ZOOLOGY (Vol. 22, No. 1) that the silver gull is the only known seabird to be able to double-brood.

Nicholls and co-workers trapped and tagged 559 breeding silver gulls and observed 50 marked pairs for six months. They found that 33 doubled-brooded successfully and 15 unsuccessfully. The average period between the time the first egg was laid for the first brood and when the first egg was laid for the second brood was approximately 130 days.

Nicholls also noted that the chicks remain on parental territory until seven weeks old. The earliest batch of young tend to stay longer with their parents than the second batch. Nicholls suggests that this behavior may be a possible consequence of double-brooding—"it being necessary in this case for the adults to stay at the breeding grounds and hold the territory for the succeeding clutch, a fact of which the first-brood young thus take advantage."

The treehopper's chemical alarm

Three species of the insects known as treehoppers have been found to possess alarm pheromones (chemical substances emitted as signals) that are released only upon the rupture of the insect's body.

L. R. Nault of the Ohio Agriculture Research and Development Center in Wooster, T. K. Wood of Wilmington College and A. M. Goff of Ashland College, both in Ohio, report in the May 24 NATURE that when they placed disks containing crushed treehoppers in the center of treehopper aggregations, the insects respond within 20 seconds by raising their abdomen and walking to the opposite side of the leaf. No treehopper responded to untreated paper disks. However, 42 of 63 treehoppers reacted to disks treated with a greenish fluid obtained by puncture of the body wall.

"Our results," the researchers say, "demonstrate that treehoppers produce alarm pheromone(s) which repel other members of the species. Treehoppers apparently cannot release the pheromones unless the body wall is punctured, such as by an attacking predator. . . . This is the first report of an alarm pheromone in an insect which requires the rupture of the body wall for its release."

Lead in rodents along highways

Three University of Virginia environmental scientists have found abnormally high levels of lead in the bodies of white-footed mice, short-tailed shrews and meadow voles captured along highways—an indication of absorption from motor vehicles fumes. Lead concentrations were highest in animals found closest to the road and decreased with increased distance. "The single most important use of lead today is as an antiknock additive in gasoline," note the researchers. Lead levels were higher in the shrew than in the other species due to its higher metabolism rate, which requires heavier respiration and greater food consumption.

Other studies have shown that one-fourth the amount of lead ingested by the shrew, mouse and vole (relative to body weight) has proved fatal to cattle. A U.S. Public Health Serviee study shows that humans can contract lead poisoning when exposed to less lead than the roadside animals.

Having your defense and eating it too

The wriggling larva of the sawfly has added a new twist to the ageless art of self-defense. It takes the toxic resin of its favorite food, the Scotch pine, and uses it to fend off its own attackers while itself outmaneuvering the toxin's potentially lethal effects. A team of Cornell scientists discovered this clever adaptation while studying the sticky oral discharge the larvae give off when disturbed. Chemical analysis showed that the discharge contains volatile pinenes and resin acids like those of pine needles and bark. Content analysis of the animal's midgut, however, showed no traces of these chemicals, they report in the May 31 SCIENCE. Dissection revealed two pouches filled with the liquid and lined with an impervious cuticle to seal it off from the animal's sensitive gut tissues. Although the mechanism is not yet understood, pine resins are somehow removed from the needles and bark and shunted to the pouches without exposing the animal to the potentially damaging chemicals. Compressor muscles allow expulsion of the liquid to drive off attackers. The researchers observed the efficiency of this defense on attacking ants and spiders. The sawfly larva, which has its defense and eats it too, may be just one among many animals with similar capabilities as yet undiscovered.

Carpetweed: An evolutionary signpost

Plants can use one of two different photosynthetic pathways. Scientists suspect that one evolved after the other, but finding a plant with an intermediate pathway or intermediate plant characteristics has eluded them. Until now. Two researchers of the University of California at Berkeley, R. A. Kennedy and W. M. Laetsch, report in the June 7 SCIENCE that the lowly but ubiquitous carpetweed, *Mollugo verticillata*, may be just such an intermediate. It appears to have characteristics of both C_3 plants (in which the first photosynthetic product is a three-carbon compound) and C_4 plants (which first produce four-carbon compounds). Several features are used to distinguish C_3 from C_4 plants, and the carpetweed seems to have some of each: The leaf and cell anatomies show structures characteristic of both; the photosynthetic products are both three- and four-carbon compounds, and the photorespiration ratios are intermediate. The existence of such transitional species is likely, they say, if in fact, one plant type postdates the other and evolved under selective environmental pressures.

Hardwood trees: Living blowtorches

Arborists have known for decades that flammable gases, including methane, are sometimes trapped in the trunks of living trees. Occasionally, the gas pressure, if tapped, is sufficient to support a blue flame—a kind of living blowtorch. Joseph G. Zeikus of the University of Wisconsin at Madison and James C. Ward of the U.S. Department of Agriculture Forest Products Laboratory in Madison have traced the origin of the methane and report their findings in the June 14 SCIENCE. They tested core samples from four hardwood tree species, American elm, black willow, white poplar and eastern cottonwood, all growing in poorly drained soils. Methane was detected only in gas samples from trees with "wetwood," a water-soaked form of heartwood. By diluting and plating the "fetid liquid" from methane-positive trees, they found dense bacterial growth, including large numbers of methane-producing bacteria. Almost all cottonwoods tested had the infection, Zeikus says, and "people have never known that infection to this extent" existed in healthy hardwoods. The infections probably started via root injuries in the water-soaked soil. The finding is important, he says, because it may explain the relatively short lifespans of cottonwoods, and may aid the forestry industry in hardwood production.