

## Tropical trickery: Birds sound false alarm

When a hawk soars over a flock of feeding birds, a cry of alarm triggers a dash for cover. In a flock of birds made up of various species, as in the Amazonian rain forests, birds of just one of the species almost always sound this warning. These "sentinel" birds, which are especially skilled at spotting flying objects, sit attentively while the other birds rummage through leaves or study nearby bark and foliage in search of insect prey. But often the sentinel sounds the alarm falsely, just to snatch for itself an insect flushed from hiding by another bird.

While there are many examples of deception between a predator and its prey, there are few examples of trickery between animals of the same species or those living cooperatively. The sentinel birds' use of an alarm call to distract other birds and so increase the sentinel's chance of capturing prey is reported in the Jan. 9 NATURE. "[It] suggests that deception among animals may be more widespread than is generally assumed," says Charles A. Munn of Wildlife Conservation International, located at the New York Zoological Society in Bronx, N.Y.

The deceptive behavior is part of a specialization of labor and an apparently unwilling sharing of resources within the bird flock. The rain forest that Munn studied in southeast Peru has two layers of bird flock territories. Different bird species are found in the canopy and the understory flocks, but each of the two levels has a sentinel species. And both the sentinel species issue false-alarm warning cries, Munn reports.

Each sentinel species relies on the insect-hunting abilities of other birds for most of its food. The sentinels position themselves below a group of foraging birds and wait for an insect to flee the predators. Then, both the foraging bird and the sentinel fly after the insect, and the fast-flying, highly maneuverable sentinel often wins it. But just to make sure, the sentinel may give its alarm cry as the birds dart through the air. The other bird hesitates, and the sentinel grabs the prize. Munn observed that the white-winged shrike-tanager, the sentinel for the canopy flocks, sounded an alarm four times as often when it and another bird were chasing an insect as when it was chasing an insect alone.

About half the categorizable alarms are false, Munn reports. He recorded the alarm cries of the shrike-tanager and of the bluish-slate antshrike, the sentinel species of the understory flocks. True and false alarm cries were similar in a spectrographic analysis, although the false alarm cries tended to be shorter. When Munn played back alarms to a flock, the birds reacted to both true and false alarms as true alarms.

Why don't the foraging birds recognize

that the sentinel is "crying wolf"? They do, Munn says, but they usually still lose the contested insect. When a bird hears an alarm while darting after an insect, it does not immediately go for cover as it would if it heard an alarm while foraging. Instead, it glances at the sentinel—which dives for cover after a true alarm cry, but which soars out toward the insect after a false alarm. By taking its eyes off the in-

sect momentarily, however, the forager usually loses the prey.

In the long run, that may be a small price to pay for sentinel protection. Each bird seems to lose only a small fraction of its food to the sentinel, Munn says, whereas the sentinel is extremely effective in protecting the flock from hawks. "The potential penalty . . . for ignoring even one alarm call might be death," Munn says, "so it is not surprising that flock birds seem to take all alarm calls seriously." — J.A. Miller

## An economic case for banning smoking?

"The leading cause of premature death among adults in 1985 was not famine [in Africa], warfare, or the attacks of international terrorists: It was cigarette smoking," says William Chandler, author of a report issued last week by the Worldwatch Institute in Washington, D.C. Already more than a billion people smoke. And the rate at which they consume tobacco—almost 5 trillion cigarettes daily—is growing about 2.1 percent annually, faster than the world population. This obvious difficulty in controlling tobacco's lethal addiction, according to the report, suggests that "stronger medicine" is needed: a banishing of smoking from the workplace and public buildings.

"Almost one-fifth of all U.S. deaths can be traced to cigarette smoke," reports Chandler, a senior researcher at Worldwatch. Together, lost income associated with those 375,000 deaths and lost work from smoking-related illnesses cost the United States between \$27 billion and \$61 billion annually, the report says, or \$1.25 to \$3.15 per pack of cigarettes smoked. (This does not include the cost of the tobacco itself—another \$30 billion a year.) Worldwide, the report continues, the cost is much higher: 2 million to 2.5 million smokers die each year from heart disease, lung cancer and emphysema.

Discouraging public support of strong antismoking measures has been the prevailing attitude that smoking, as a habit of choice, conveys health risks that users have consciously accepted. What this attitude doesn't address, Chandler says, is the fact that tobacco is strongly addictive (see p. 44) and that smoke harms more than just the smoker.

Passive smoking (inhaling the smoke of another's cigarette) has been linked to lung cancer in nonsmoking spouses of smokers in more than 10 studies, Chandler notes. A study published last year in ENVIRONMENT INTERNATIONAL (Vol. 11) "estimated that passive smoking in the United States causes more cancer deaths than all regulated industrial air pollutants combined"—perhaps 5,000 people annually, or one-third of the lung cancers not directly attributable to smoking, Chandler reports.

Maternal smoking, the report notes,

has been associated with increased rates of miscarriage and low-birthweight babies. Parental smoking also has been linked epidemiologically to other hazards in children, including reduced lung capacity, higher rates of respiratory illness, cancer (SN: 5/18/85, p. 312) and slow intellectual development.

In the United States, the report says, only 14 percent escape involuntary exposure to cigarette smoke both at home and at work. "The rest," Chandler estimates, "involuntarily 'smoke' on average the equivalent of almost 1 cigarette per day," and for some the number is considerably higher. Though it is theoretically possible to ventilate buildings to remove the passive smoking threat, Chandler cites data indicating that to do so would require replacing the volume of air in affected rooms about 250 times more often than it normally is replaced—measures that would increase heating, cooling and air pumping costs 250-fold.

The most cost-effective way to protect nonsmokers' health is therefore to banish smoking from the workplace and public buildings, he says. And U.S. industry is adopting this strategy increasingly. In 1984, for example, 10 to 25 percent of the top 1,000 businesses engaged in publishing, insurance, finance, pharmaceuticals and scientific equipment either banned smoking or separated smokers from nonsmokers, according to the report. Chandler notes that many of these firms, while responding to the rights of their nonsmoking employees, were doubly encouraged to adopt these policies by potential financial gains.

"Smokers cost employers money," Chandler says. Surveys indicate that the inefficiency and illness fostered by smoking waste about 7 percent of a smoker's time. More tangible are the data he cites showing that, on average, each smoker costs an employer \$650 in additional insurance and cleanup costs.

Scott Staph, a spokesperson for the Tobacco Institute in Washington, D.C., criticized the report's economic projections of smoking's health effects and productivity losses as "fanciful extrapolations that have very little to do with hard, factual data." — J. Raloff