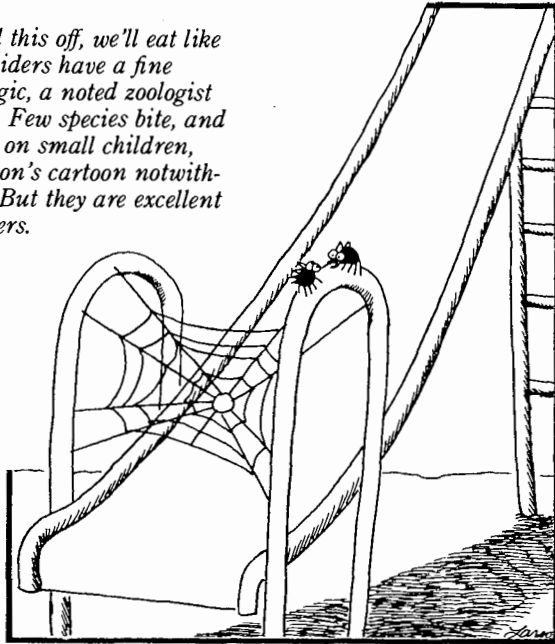


SCIENCE & TECHNOLOGY

*"If we pull this off, we'll eat like kings." Spiders have a fine sense of logic, a noted zoologist has found. Few species bite, and none dine on small children, Gary Larson's cartoon notwithstanding. But they are excellent game players.*



lasting from a few seconds to 21 hours, they use up to 28 fighting techniques (e.g., biting, shoving, dragging, tumbling) to protect their turf and conquer adversaries. Their strategies accord with man's logical model.

Riechert sees this as a partial confirmation of evolutionary game theory. Spiders are not unique, just easy to observe. If they play games well, she believes, so must harder-to-study creatures.

*The Retrovirus*

"The First Human Retrovirus" & "The AIDS Virus" by Robert C. Gallo, in *Scientific American* (Dec. 1986 & Jan. 1987), 415 Madison Ave., New York, N.Y. 10017.

Developments involving cancer and AIDS (Acquired Immune Deficiency Syndrome) are much in the news. What is not being reported, says Gallo, a National Cancer Institute physician, is that the two are linked.

The common element is called a retrovirus. Only one ten-thousandth of a millimeter long, wrapped in a double layer of fat, this grain of life is essentially made of proteins, two strands of RNA (ribonucleic acid), and an enzyme called reverse transcriptase.

Retroviruses are unique. They encode genetic information *not* in DNA (deoxyribonucleic acid)—the normal genetic storehouse—but in RNA, a similar but different molecule crucial to cell reproduction. Retroviruses penetrate cells, disrupt their genes, and either halt their growth, as with white blood cells in AIDS, or spark wild proliferation—that is, cancer.

That retroviruses can induce tumors in animals is well known: The

---

**SCIENCE & TECHNOLOGY**


---

Rockefeller Institute's Peyton Rous isolated the first animal retrovirus in 1910. But it was not until 1978 that Gallo and colleagues found the first *human* retrovirus: Human T-cell Lymphotropic Virus, or HTLV-I, which sets off leukemia. In 1982, another carcinogenic retrovirus, HTLV-II, was identified. Then, in May 1983, Luc Montagnier and his associates at France's Pasteur Institute published details of a third human retrovirus, HTLV-III, now known to cause a then obscure illness: AIDS.

The link between retroviruses, cancer, and AIDS is only now being clarified, says Gallo. This much is known: HTLV-III attacks the immune system and the nervous system. Killing brain and spinal cells, it prompts symptoms akin to dementia and multiple sclerosis, plus a skin cancer, Kaposi's sarcoma. Neither AIDS nor cancer is a disease of any one group, says Gallo. Retroviruses are spread by "intimate contact," but "the form of contact seems to be less important than the contact itself."

How did retroviruses get going? No one knows. They seem to have emerged from Africa. HTLV-I has been spotted in the Caribbean, the Americas, and Japan. (Gallo speculates that Portuguese slave traders may have transported HTLV-I there during the 16th century.) HTLV-III, though, is a recent variant. Blood samples taken around the world as early as the 1950s show no sign of it—except in Africa. Somehow, during the 1970s, Gallo believes, HTLV-III spread to Haiti, Europe, and America.

Researchers are trying to develop retrovirus-fighters. One promising drug: Azidothymidine (AZT), an anticancer potion that blocks the action of HTLV-III on host cells.

---

**RESOURCES & ENVIRONMENT**


---

### *Why \$1 Water?*

"Water: Not as Cheap as You Think" by Peter Rogers, in *Technology Review* (Nov.-Dec. 1986), Massachusetts Institute of Technology, Room 10-140, Cambridge, Mass. 02139.

Samuel Taylor Coleridge's line about water everywhere without "any drop to drink" has meaning for landlubbers too. Worldwide, the yearly volume of rain, the source of "new" fresh water, is 126,000 cubic *miles*. But 78 percent of that falls at sea. Most of the rest is lost to evaporation or floods. Only 3,000 cubic miles winds up in rivers and reservoirs.

But demand for water is expanding, observes Rogers, professor of environmental engineering at Harvard. Some 86 percent of the world's rural population lacks adequate supplies. Saudi Arabia has built costly plants to desalinate seawater. China is considering a \$20 billion dam to shunt irrigation water from the Yangtse to the Yellow River basin. The Soviet Union, though it has more rain than any country but Brazil, began an effort—since halted, mostly for cost reasons—to reverse the flow of three Siberian rivers to aid grain-growing in central Asia. All nations, Rogers argues, must move beyond "the common perception of water as a free and unlimited resource."

Agriculture is the top consumer; in the United States, farming absorbs