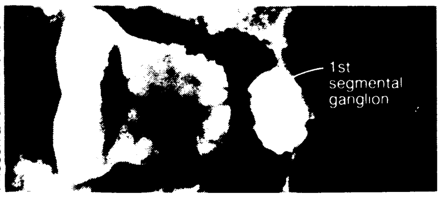


Friesen and Brodfuehrer

Subesophageal ganglion (A) containing Tr1 cells.

were linked also to cells on the body wall that initiate swimming and that sense touch, pressure and pain, the scientists stimulated these sensory cells while monitoring the Tr1 cells. They found that stimulation of the sensory cells was followed immediately by bursts of activity in the Tr1 cells.

Finally, to make sure their observations in isolated nervous systems actually corresponded to the leech's swimming behavior and were not just artifacts from their experimental procedures, the researchers recorded firing patterns from Tr1 cells of leeches that were nearly entirely intact. In this way, they could monitor what specific cells were doing during whole-animal behaviors such as swimming. They observed the same electrical patterns in Tr1 cells regardless of whether the cells were in intact swimming leeches or in their isolated nervous systems.

Before Friesen and Brodfuehrer's discovery of the Tr1 cells, scientists did not know how leech sensory cells were hooked up to the neurons that generate the oscillating swim signals. Several labs have been looking for the connection, notes neurobiologist Bill Kristan of the University of California at San Diego, but they were searching in the segmental ganglia. The missing links, report Friesen and Brodfuehrer, are the Tr1 cells, whose somas or bodies are located in the relatively large subesophageal ganglion in the head region and whose axons extend down the length of the animal. Says invertebrate biologist Ronald Calabrese of Emory University in Atlanta, "Finding these critical interneurons [such as the Tr1 cells] is the most difficult thing."

With the final link in the neural chain fastened into place, biologists can now tell a neural story of leech swimming. The two Tr1 cells receive input converging from roughly 150 sensory cells along the body and from other cells not yet identified. The Tr1 cells then trigger at least 92 neurons distributed among the segmental ganglia. These cells in turn set off another category of neurons that generate oscillating signals, which are sent to still other neurons that control the muscles. The result of such a chain of events is the undulatory movement that leeches use to swim. And since similar mechanisms are used in some rhythmic movements of most animals, Friesen suggests that more neural stories, analogous to the one for leech swimming, could be constructed and tested. *—I. Amato*

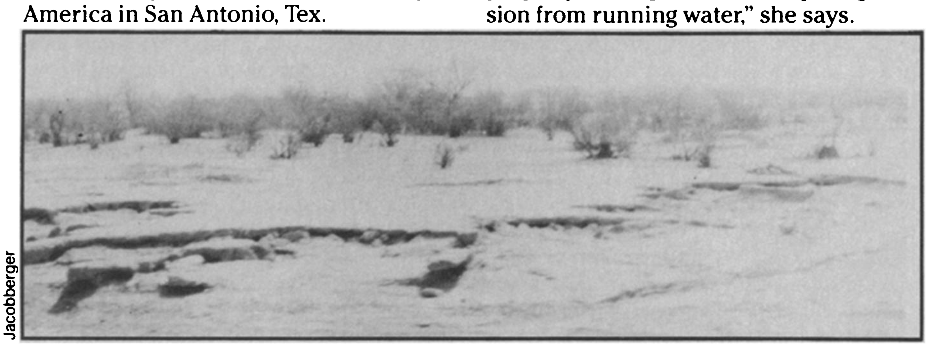
Erosion from water in parched lands

It's ironic that in the African Sahel's 20-year battle with drought and famine, one enemy could turn out to be water. But at two study sites along the inland Niger Delta in the west African nation of Mali, geologist Patricia Jacobberger has found that running water can cause more erosion and greater loss of fertile soil than does wind.

"I suspect that this was known in various pockets of the scientific community," she says. "But in the context of the desertification of Africa, the emphasis to this point has been on [wind erosion] processes." Jacobberger presented some results from her ongoing studies at the recent meeting of the Geological Society of America in San Antonio, Tex.

cracking of the soil and evidence of "sapping," in which surface water takes soils down in the ground and then flows away, leaving holes in the ground. In general, water erosion not only carries away productive soils but also breaks up the soils it leaves behind, making them more vulnerable to wind erosion.

Wind erosion and the encroachment of sand dunes are major factors in desertification in places like the Sudan and parts of Egypt. They also play a role in Mali, says Jacobberger, but in the inland delta, water erosion dominates. "So, in addition to managing for soil erosion against wind processes, we need to look at how to properly manage soils anticipating erosion from running water," she says.


Jacobberger

Water causes more erosion in parts of Mali than does wind. Here running water has broken up and eroded sediments in the inland Niger Delta.

Largely because data on the region are so scarce, scientists have yet to understand what is drying up the Sahel (SN: 5/4/85, p.282). So researchers have begun to use remote sensing to document changes in these lands at the southern edge of the Sahara. Jacobberger, who works at the National Air and Space Museum in Washington, D.C., has also been conducting field studies to help her interpret satellite images of the drought-stricken region.

Her work is among the first to show that increases in the albedo, or reflectivity, of the land surface are linked to surface changes brought on by drought. In comparing satellite data recorded in 1976 and in 1985, Jacobberger found that albedo increased by 15 percent in the upper delta where streams branching from the river had dried up. Smaller albedo increases occurred at levy deposits where the disappearance of plants and trampling of the ground have made the surface more reflective. In the more recent images, albedo "halos" have appeared around villages, reflecting the loss of vegetation, erosion and the breakup of soils — all of which have dried out the land and increased surface reflectivity.

Jacobberger says the most pronounced erosion has occurred on land exposed to running water. These are places in which the rainfall is too low to keep plants alive but still great enough to run over the soils. She has found extensive gullies,

Jeffrey Gritzner of the National Academy of Sciences' Board on Science and Technology for International Development says it's not very surprising that water erosion is dominant around Mali, because the land there lacks perennial ground cover. Such plants would stabilize the soil when the rain arrives each year after the dry season. He says agricultural expansion and cattle grazing on grasses have destroyed the perennials.

On the other hand, Jacobberger, noting that she's seen only 10 cattle during her field studies, says cattle are just a small part of the problem. But she agrees that the vegetation needs to be managed so that there is ground cover all year.

Jacobberger's work is part of a larger study exploring the changes in brightness and color of a spectrum of environments: hyperarid Egypt; Mali, which is undergoing active desertification; and Botswana, which has sand dunes stabilized by plants with ample water. "The ultimate goal is a better understanding of the physical surface processes that are operating during desertification," she says. "Because if you don't fundamentally understand the cause, it's very hard to find a cure. . . . And if you want to ensure that the soils are productive when the rains do come again, you need to have prevented them from having eroded away." *—S. Weisburd*

News of the week continued on p. 347