ENDANGERED SPECIES

Migrating Otters Push Law to the Limit

Fourteen years ago, Congress declared the Southern California coast an otter-free zone—but the unwitting creatures aren't cooperating. That's no surprise to federal biologists, who this summer issued a report concluding that the otter-free zone harms the already-endangered population. Federal officials are now trying to come up with a better plan, but it's likely to draw from politics as well as science.

Hearings last week in Santa Barbara and Monterey showcased a decades-long tussle over the range of the southern sea otter, which was hunted nearly to extinction during the 19th century. The few dozen animals that remained in 1911 expanded along California's central coast, but by the late 1970s the colony still numbered fewer than 2000, earning it a place on the endangered species list. Worried that an oil spill or other catastrophe could wipe out the entire population, officials from the U.S. Fish and Wildlife Service (FWS) proposed an ambitious relocation plan in the early 1980s to transport more than 100 otters to San Nicolas Island, 100 km west of Los Angeles.

Moving south. California sea otters have migrated into the official no-otter zone, threatening fisheries.

CREDIT (LEFT TO RIGHT): J. MCDONALD/VISUALS UNLIMITED; SIRTF/NASA/JPL

The fishers in the region were furious about this plan to establish a second colony. Although sea otters are undeniably cute, their voracious appetites are far from endearing. Lacking blubber, the animals keep warm with a racing metabolism that drives them to eat a quarter of their 30-kilogram body weight each day—mostly invertebrates such as clams, sea urchins, and abalone. "We have size limits, but otters don't," says commercial sea urchin diver Bruce Steele, who is based in Santa Barbara. "They do an awful lot of damage really quickly."

In 1986, Congress struck a compromise that declared the waters south of Point Conception to be a no-otter zone—except for the experimental colony on San Nicolas Island. FWS was required to round up any otters that strayed into the divers' zone and cart them back to San Nicolas or north of Point Conception—a task that proved exceedingly difficult.

For some reason, few otters were content to stay at San Nicolas. Although FWS relocated 140 animals, fewer than 25 live on the island today. FWS spent several years rounding up stray otters, but in 1993 the agency quietly stopped transporting animals to San Nicolas and also stopped enforcing the no-otter zone.

The implicit decision to abandon the policy might have remained in place had not an adventurous troop of some 100 animals decided to migrate south in early 1998. "They knocked down our harvest resources by 80% or 90% in 2 years," says Steele, explaining why he and other commercial divers filed suit in May to force FWS to maintain the no-otter zone.

FWS has defended its biological ground in a report issued last month. The agency says that the animals are still imperiled—their numbers fell from a 1995 high of 2377 to 2090 in 1999 before an increase this spring. And the exclusion zone is not helping. Not only do some animals die during capture or in transit, but introducing stray animals into existing colonies in the north can disrupt the current inhabitants and threaten their health. FWS biologists conclude that "continuing the containment program would jeopardize the existence of the species," says Greg Sanders of FWS. The move south "likely represents a natural range expansion" vital to the population's health, he says.

FWS is now considering several options. One is to declare the original relocation plan a failure because the colony at San Nicolas is too small for its original purpose: to rescue the species if the mainland population were wiped out. That admission would mean moving the remaining San Nicolas otters to the mainland and abolishing the no-otter zone.

Sea otter advocates prefer a second option, which would leave the San Nicolas colony in place and abandon the no-otter zone. The animals at San Nicolas are reproducing, they note, and otters born there might be more likely to stay. To that end, FWS is devising a supplemental environmental impact statement that will compare

ScienceScope

Protein Rush The race to understand the proteins assembled by human genes is powering up. Within a few weeks, Celera Genomics of Rockville, Maryland, expects to get a prototype of a sophisticated mass spectrometer which it claims will increase by a factor of 10—and, ultimately, by as much as 100—the number of proteins researchers can analyze at one time.

Currently, scientists can sequence about 300 proteins per hour on a good day. But Celera chief J. Craig Venter "soon" foresees decoding 30,000 an hour, and eventually up to a million a day. Identifying proteins is considered a key to designing new drugs.

Celera has ordered 20 of the new devices, which are being built by Applied Biosystems of Foster City, California, a sister company of Celera, Venter told pharmaceutical and biotech executives last week at a meeting in Boston. He also laid out a typically ambitious plan for his company in the burgeoning field of proteomics, but he admitted that Celera is unlikely to hold the kind of sway that it did in the gene-sequencing world. Indeed, the competition promises to be fierce, as other companies are pouring money into other technologies and research strategies (*Science*, 24 March, p. 2136).

Given the complexities of unraveling protein structure and function, Venter says, there is room for everyone. The field, he says, has "an open-ended horizon."

Delayed NASA's massive Space Infrared Telescope Facility—the last of the space agency's planned great observatories which began with Hubble—was scheduled for a December 2001 launch. But agency officials quietly told researchers last week that the $53 million mission, which will chart cooler objects such as dust clouds and asteroids, faces delays. One NASA manager says that a programming problem with the control system for the satellite's camera will force a 4- to 6-month launch delay. Fixing the glitch in the system, which is the responsibility of the Goddard Space Flight Center in Greenbelt, Maryland, will cost about $2 million. Keeping the 1-ton spacecraft on the ground longer, however, will add $30 million to $50 million to the program's cost, NASA officials say.

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the effect on otters and on fisheries of continuing, modifying, or abandoning the otter-free zone.

Diver Steele hopes for a compromise that would leave the San Nicolas otters in place and create a smaller otter exclusion zone around key fishing areas. That approach, he says, might enable otters and commercial divers to coexist—at least for a time. "[The otters] are coming, and when they get there it's pretty much over for us," he says. "I know I'm going to lose, but I'm trying to lose as slowly as possible."

–GRETCHEN VOGEL

* Available at: www.r1.fws.gov/vfwo

PALEONTOLOGY

Team Rejects Claim of Early Indian Fossils

NEW DELHI—A team of Indian paleontologists has failed to find evidence to support a 1998 paper that cast doubt on the earliest claimed dates for the origin of animals.

Two years ago an Indo-German team of paleontologists pushed back the origins of multicellular life by 400 million years to an astounding 1.1 billion years with the discovery of trace fossils in central India (*Science*, 2 October 1998, pp. 19, 80). The findings were immediately challenged by Rafat Jamal Azmi, an Indian paleontologist working at the Wadia Institute of Himalayan Geology in Dehra Dun. Writing in the *Journal of the Geological Society of India* (GSI), Azmi described finding small, shelly fossils (SSFs)—widely agreed upon as being 540 million years old—in a rocky layer in the Vindhyan Mountains that he claimed was laid soon after the sediments from which the trace fossils were discovered, casting doubt on the antiquity of the earliest animals. The discovery, if true, would have made the mountains much younger than previously thought.

CREDITS (TOP TO BOTTOM): C. CAIN; R. J. AZMI/WIHG

Forever young. Rafat Azmi says this algal ribbon fossil supports his claim, rejected by an Indian panel, of a more recent age for the Vindhyan mountain range in central India.

The society asked a team of more than a dozen distinguished Indian scientists to investigate Azmi's claim. The team reports in the June issue of the GSI journal (vol. 55, p. 675) "that the identification of fossils by R. J. Azmi is far from convincing, and that more detailed work [would be] necessary before the authenticity of the find is accepted." The report says that the presence of small, shelly fossils could not be confirmed either by its own team or by a panel assembled by the Geological Survey of India, whose members visited the site and collected samples that were "devoid of SSFs."

Shashi Bhushan Bhatia, a micropaleontologist and former professor at Panjab University in Chandigarh, led the GSI panel that investigated Azmi's findings and physically examined Azmi's fossils. He says that Azmi turned aside specific questions from the panel and "came up with new data" each time he was quizzed.

However, Azmi says that the two investigations "confirm the reproducibility of morphologically similar forms" and that he stands by his original finding. The controversy, he adds, is a "nonissue and an unfortunate fallout" resulting from "nonexperts [who] have poked their noses into a highly specialized field." He says the debate has fallen into the "realm of subjectivity" but that "there is no question of any contamination or misrepresentation" of the samples.

The geological society has no plans to publish anything more on the matter nor take any action against Azmi. "It will not serve any useful purpose to prolong this debate," says the journal's editor, M. Ramakrishnan, adding that "no further correspondence will be entertained." Azmi has protested the policy, however, and asked for an international panel of experts on small, shelly fossils to take another peek at his original sample.

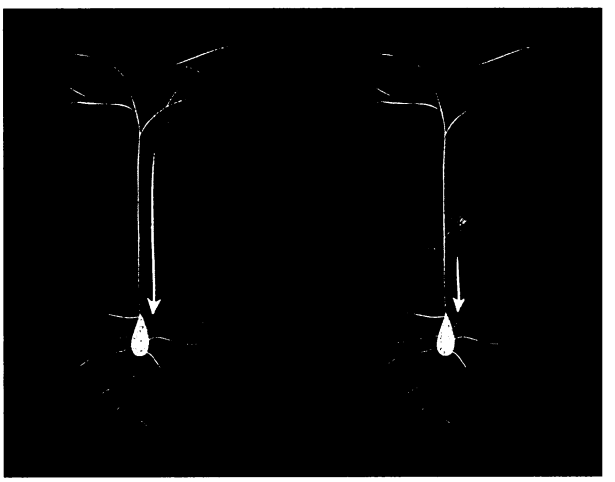
–PALLAVA BAGLA

NEUROSCIENCE

Synapses Shout to Overcome Distance

How do you make yourself heard if you are standing far from the fray? If you are a synapse, like a human, you shout. So says new research published in the September issue of *Nature Neuroscience,* answering a question that has perplexed neuroscientists for decades: namely, how a message delivered at a synapse far from the cell body—which must fade as it travels through the cell—can make itself heard above the din of messages picked up by close-in synapses.

Neurons receive signals sent by other neurons via long tendrils called dendrites that branch out from the neuronal cell body. The neuron fires, passing along its own message, only after the cell body receives and sums up some threshold level of dendrite-transmitted messages. Recent evidence has suggested that hinterland synapses do pick up useful signals, but no one knew quite how.



Speak up. Synapses far from the cell body send stronger signals than do those nearby.

Suspecting that distant synapses might speak with louder voices, neuroscientists Jeffrey Magee of Louisiana State University Medical Center in New Orleans and Erik Cook of Baylor College of Medicine in Houston, Texas, stimulated synapses locally and listened in as they fired. When this happens, the resulting signal is transmitted to the cell body by an electric current generated as ions surge in and out of the cell across its outer membrane. When the researchers measured this current, they found that the more distant the synapses, the stronger the signal. By the time the signals reached the cell body, those that traveled long distances sounded about as loud as those that originated nearby.

The finding "will open up a whole new field," says Daniel Johnston of Baylor College of Medicine, who adds that neuroscientists will want to know "How does the cell know [to build more powerful synapses at a distance]? And how does [the current gradient] develop?"

Magee says that many potential mechanisms could contribute to stronger signals from distant synapses. One possibility is that neighboring cells send more units of their chemical neurotransmitters when they communicate with farther-out synapses, although it's unclear how the neurons might be trained to do this. Alternatively, within the receiving dendrite, distant synapses may be literally bigger, studded with more of the receptors that detect incoming messages. Magee hopes to tease these possibilities apart, starting by using an electron micrograph to see whether far-flung synapses stretch out over a larger area than those close to the cell body.

–LAURA HELMUTH