La Jolla, California, has also found that the axons connecting the pontine nuclei—structures in the mammalian brain that link each hemisphere to the opposite half of the cerebellum—to the spinal cord grow very slowly and lack growth cones. "Something about the structure of neurofilaments allows for this [slow but sure] kind of growth," speculates SUNY Stony Brook's Schechter.

But other researchers caution that the hints of neurofilament-driven axon growth in other species don't mean that their axons can match the regenerative prowess seen in the lamprey. Lamprey nerves lack the myelin sheath that protects mammalian nerves, for example, and lampreys have only one type of neurofilament protein, while humans have at least three. Nor has Selzer figured out yet how to boost neurofilament production in lamprey nerve cells, let alone human paraplegics.

Thanks to the new finding, though, neurofilaments may not be the only things trading in their passive stability for dynamism and flux. The doctrines of many scientists studying neural growth and regeneration, says Allegheny's Fischer, "are less rigid now."

–Wade Roush

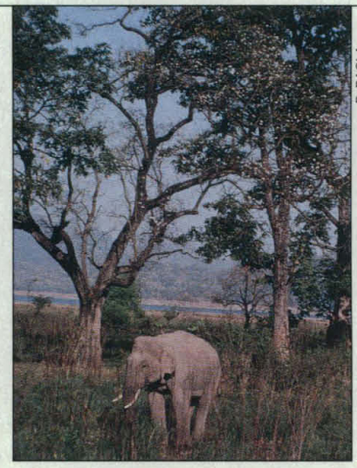
EVOLUTIONARY BIOLOGY

Longer Tusks Are Healthy Signs

NEW DELHI—The long tusks of some male Asian elephants may advertise the genetic vigor of their bearers, shows a new study by two Indian researchers. Unfortunately, long tusks are also a come-on for poachers, who take a heavy toll on the endangered elephant. Ivory hunters may thus be depleting the elephant populations of the individuals with the healthiest genes.

The study's finding—that male elephants with longer tusks have fewer parasites—supports a theory explaining such secondary sex characteristics put forward in 1982 by evolutionary biologist William Hamilton of the University of Oxford in the U.K. Hamilton proposed that males carrying genes for resistance to parasites will be healthier and, hence, in a better condition to develop expensive secondary sexual characteristics, which then enable females to choose mates carrying the best genes. Studies of invertebrates, fishes, reptiles, and birds have all supported the theory.

The elephant findings, which appear in a recent issue of India's *Current Science*, provide what co-author Raman Sukumar, an ecologist at the Indian Institute of Science in Bangalore, calls "the first demonstration" of its kind in mammals. For Raghavendra Gadagkar, a sociobiologist and chair of the Centre for Ecological Sciences at the Bangalore institute, it also suggests a pressing concern. "The importance of the present work lies not in its conceptual novelty, but in its implications for conservation of elephants," he says (see below), "for ivory hunters are most likely to cull the best males."



P. BAGLA

Size matters. Bigger tusks mean fewer parasites for Asian elephants.

The 3-year study was carried out at Mudumalai Wildlife Sanctuary in southern India. The researchers identified elephants from photographs and unique body markings and collected fresh dung samples from as many as 38 animals. They then tested the dung samples for intestinal helminth parasites, finding as many as 20 million parasite eggs per dropping. Although these densities "may not be life threatening," Sukumar says, in lean periods and in stressed conditions, the parasites could significantly weaken the elephants.

Sukumar and his colleague, microbiologist Milind Watve, also developed a standard growth curve of tusks using a series of field techniques—enlarged photographs, height measurements of live individuals and museum specimens, and postmortem examinations. They then plotted the amount by which each male elephant's tusk length exceeded the standard curve against the parasite densities found in its dung. The scientists found that the longer an elephant's tusks, the fewer parasites are found in the animal's dung.

Hamilton says he's "pleased to see these results from the 'king of mammals,' " adding that this study may convince skeptics, who offer other explanations for the correlation between exaggerated sex characteristics and parasites. In particular, the characteristics become exaggerated with age, while the number of parasites declines with age in most animals. Sukumar agrees that the findings are "compatible with, but not necessarily a substantial proof of," Hamilton's hypothesis in elephants.

Among other unanswered questions is whether longer tusks really do attract females, although Hamilton says females "contentedly mate with a dominant male" and that older and more dominant bulls usually display longer tusks. Nor is it clear yet that parasite resistance in elephants has a genetic basis.

But if tusk length is a sign of good genes, poaching may be weakening the elephant gene pool by removing parasite resistance genes from the population—something that could become a "serious health problem" for wild populations, says Sukumar. And Hamilton says that the solution, while obvious, isn't likely to be implemented. "Never cull the top bulls; cull old but small-tusked males," he says. "Of course, that is the opposite of what hunters do if they want to make a profit."

–Pallava Bagla

Pallava Bagla is a science writer in New Delhi.

Ivory Trade Seen as Threat

The decision last week by an international body to permit trade with Japan in ivory taken from elephants in three African nations is expected to put additional pressure on the dwindling number of Asian elephants, too. Although only stockpiled ivory from Botswana, Namibia, and Zimbabwe can be sold, the difficulty in identifying ivory's source could put all animals at greater risk, say environmentalists.

"A legal chink has been opened up in the international market," says Vinod Rishi, chief of a large conservation effort by the Indian government to protect its 27,000 elephants. "Now there is a chance of a large-scale massacre of elephants in India." Belinda Wright, of the Wildlife Protection Society of India, worries about a "dramatic and disastrous spate of poaching" and a further decline in the ratio of males to females, already as low as one to 400 in some parts of the country.

Ironically, the elephant's downlisting by the Convention on International Trade in Endangered Species comes at the same time the U.S. Congress is moving ahead with legislation to create an Asian Elephant Conservation Fund. The bill, sponsored by Representative Jim Saxton (R–NJ), would support research and conservation efforts to protect the animal and its environment. It is modeled after a program initiated in 1989 to help the African elephant. Although the bill would provide up to $5 million a year, a Saxton aide says that an annual budget of $1 million is more likely. **–P.B.**