

proteins can then “act to regulate expression of some genes” by binding to specific parts of their DNA, Safe has found.

In the June 1998 NUCLEIC ACIDS RESEARCH, Safe and his colleagues showed that cellular production of an enzyme known as cathepsin-D can triple or quadruple under the influence of such a partnership. Once some compound binds to the Ah receptor, this enhanced gene expression drops. This suggests, he told SCIENCE NEWS, “that there may be a natural function of the [keyless] Ah-receptor complex in regulating normal gene expression in cells.”

Gasiewicz cautions, however, that the Ah receptor’s dark sides shouldn’t be forgotten. For example, he says that his recent work suggests that the Ah receptor may serve as “one of the body’s master switches” for turning on genes “that transform compounds in cigarette smoke into more toxic chemicals.”

He incubated human cells with extracts of cigarette smoke and then scanned the cells for fragments called micronuclei, which are evidence of precancerous genetic changes. Cells engineered to lack



D. Nazarenko and T. Gasiewicz

Scientists at the University of Rochester have developed a blue staining technique to highlight cells whose Ah receptors have been turned on. Here, the triggered cells reside in the genitalia of a fetal mouse whose mother was given a nontoxic dose of the dioxin TCDD 24 hours earlier, 1 week before birth. Researchers have known that a developing rodent’s genitals are a target for TCDD toxicity. This staining is the first step in identifying which cells are affected and when.

the Ah receptor produced few such micronuclei, while those with the receptor made many.

Then, his team exposed mice—both normal ones and knockout mice lacking the Ah receptor—to cigarette smoke. In the November 1998 CARCINOGENESIS, his team reported that the normal mice de-

veloped many of the micronuclei, indicating gene damage, while the knockouts exhibited none. Exposure to TCDD further increased the number of micronuclei in normal animals exposed to smoke. Says Gasiewicz, “They got a double whammy.”

Taken together, these studies are teasing out new roles—and respect—for the long-dreaded Ah receptor. The most unexpected dividends of Ah-receptor understanding may emerge in medicine. Delineating what compounds trigger the receptor, and when, may lead to more effective cancer therapies (see sidebar). Gasiewicz’s team is also investigating the prospect of engineering drugs to block Ah-receptor activity. They might limit toxicity in smokers or people accidentally exposed to TCDD.

“We might even be able to achieve some of this protection naturally” by, for instance, eating more vegetables like broccoli, Gasiewicz says. “But we can’t hope to do that without a better understanding of this receptor.”

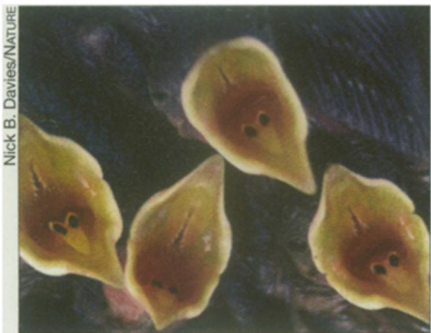
Biology

Cuckoos beg doggedly to trick hosts

Cuckoos are practiced in the art of deception. Once a clandestinely laid cuckoo egg hatches in a reed warbler nest, the chick evicts its native nestmates. The parents, as if feeding their own feathers and blood, tend to the baby cuckoo until it grows larger than both of them together and finally flies away.

Researchers have decoded how one cuckoo elicits the same feeding behavior as a nestful of hatchlings. Rebecca M. Kilner of the University of Cambridge in England and her colleagues determined that baby reed warblers signal the degree of their hunger in two ways—wide-open beaks and persistent calling. Parent warblers, they found, respond to the combination of these signals and feed their young accordingly.

The researchers then examined how the cuckoo manages “a bit of bait and switch,” as Douglas W. Mock of the University of Oklahoma in Norman says in a commentary accompanying the Feb. 25 NATURE report. The cuckoo, with its single gaping beak, cannot duplicate the visual pull of a throng of baby warbler beaks, so it tugs at the parents’ other heartstring. The baby cuckoo calls so persistently and rapidly that it sounds like a brood of eight hungry warbler chicks. The din compensates for the cuckoo’s less stimulating small gape, and the parent warblers feed it generously. —L.H.



Nick B. Davies/NATURE

Because the common cuckoo can’t display a nestful of gaping reed warbler beaks (left), it begs by imitating a chorus of chicks.

Elephants can die from herpes viruses

Two herpes viruses new to science can attack and kill elephants, pathologists report.

These are the first herpes viruses found in elephants, says codiscoverer Laura K. Richman of the Johns Hopkins Medical Institutions in Baltimore. The viruses hold special interest because they jump from one kind of elephant to another in zoos that are trying to protect the endangered species.

Many animals, from people to fish, suffer from cold sores and other miseries of herpes infections. The discovery of elephant herpes, described in a Feb. 19 SCIENCE paper, is a whodunit solved by Richman, Gary S. Hayward from Johns Hopkins, and Richard J. Montali from the National Zoo in Washington, D.C. They set out in 1995 to find the killer of Kumari, the first apolitical elephant born inside Washington’s Beltway.

The 16-month-old died after a mysterious illness that took away her appetite, left her listless, and made her tongue turn purple. Her autopsy showed massive internal hemorrhaging. Microscopic examination of tissue and DNA analysis revealed a previously unknown herpes virus. The researchers found the same virus in preserved tissues from seven other Asian elephants that had died mysteriously in North American zoos.

The same infection also turned up in African elephants in zoos. Yet this closely related species seemed to suffer nothing more serious than skin nodules and small vaginal lesions. A normally minor African virus could be turning lethal when it jumps to a different species, Richman warns. Identifying the infection early, in part by the purple tongue, allowed zookeepers in Missouri to save one young elephant with massive doses of the human herpes drug famciclovir.

The researchers have also discovered a related herpes virus that killed a young African elephant. So far, the researchers have not found a clue to its source. —S.M.