it. Another fluke, *Euhaplorchis californiensis*, causes infected fish to shimmy and jump, greatly increasing the chance that wading birds will grab them. To see if *Toxoplasma* might somehow increase its chances of getting into a cat, the Oxford team, led by zoologist Manuel Berdoy and parasitologist Joanne Webster, set up a maze with a nest box in each corner. On each nest they added a few drops of a particular odor: eau de rat's nest, fresh straw bedding, rabbit urine, or cat urine.

When the researchers set healthy rats loose in the maze at night, the curious animals shied away from the cat odor and were unlikely to return to that part of the enclosure later in the night. The researchers then put *Toxoplasma*-carrying rats in the enclosure. In previous experiments they have shown that infected rats are for the most part indistinguishable from healthy ones: They can compete for mates just as well, keep their rank in the rat hierarchy, and have no trouble feeding themselves. In the latest experiment the researchers found only one difference: The scent of a cat had no effect on them. They would explore the nest treated with cat urine at least as often as anywhere else in the enclosure. In some cases, the rats even had a fatal attraction to the cat scent.

The specificity of *Toxoplasma*'s effects argues against some general pathology. Because both infected and noninfected rats preferred rat reek to rabbit, "that reaction to predator odors is not due to an impairment of the [sense of] smell," says Berdoy. Instead, he speculates, *Toxoplasma* cysts may release a compound that interferes with a rat's own neurotransmitters, short-circuiting neurological pathways that would keep the rat out of danger.

Hurd says Berdoy's work does not close the book on *Toxoplasma,* however. "One of the key elements that they haven't demonstrated is whether it actually works, whether the host really is predated more because of this behavior," she says. "This is interesting, but it's really only the beginning."

If *Toxoplasma* finds its way into a human instead of a rat—people can pick up the parasite by handling litter boxes, eating undercooked meat, or gardening in oocyst-laden soil—it has no hope of completing its journey, because cats don't eat people. But there's some evidence that it may alter its host's behavior.

Parasitologist Jaroslav Flegr of Charles University in Prague administered psychological questionnaires to people infected with *Toxoplasma* and controls. Those infected, he found, show a small, but statistically significant, tendency to be more self-reproaching and insecure. Paradoxically, infected women, on average, tend to be more outgoing and warmhearted than controls, while infected men tend to be more jealous and suspicious. In the current issue of *Biological Psychology*, Flegr reports that these personality differences appear to become greater as people are infected for longer periods. Others are not yet convinced. Robert Simon, a psychologist at the University of Delaware in Newark, calls Flegr's work "courageous" but hardly conclusive. "I don't know for sure what to make of it; we need more people looking at [these correlations]."

Even if the changes are real, people who carry the parasite are hardly likely to throw themselves at lions. But if Flegr's findings hold up, they are a very personal reminder of the ways in which parasites try to control their destiny. **–CARL ZIMMER**

Carl Zimmer is the author of *Parasite Rex*, to be published in September.

PARTICLE PHYSICS

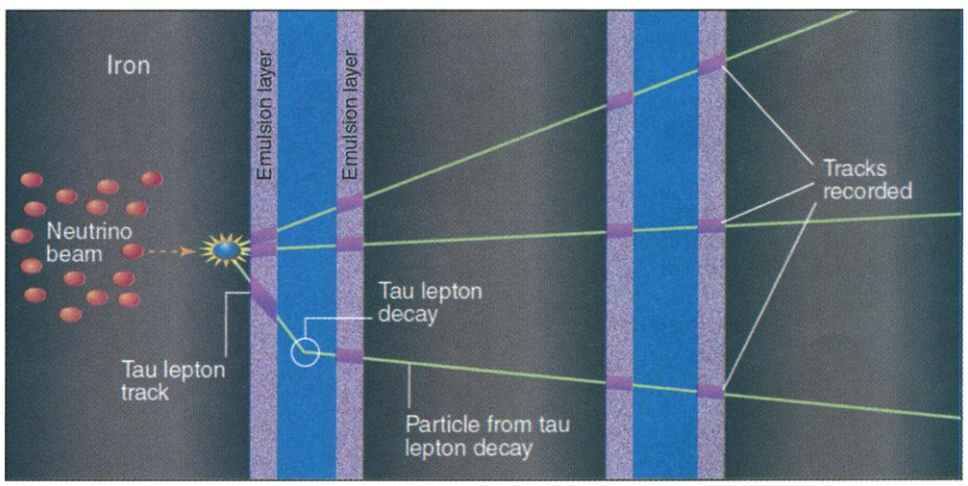
Elusive Particle Leaves Telltale Trace

Nearly massless and incredibly rare, the tau neutrino scorns its surroundings, seldom interacting with more common matter. These properties make it difficult to detect. Now, an international team of physicists has laid claim to the first "direct" detection of the tau neutrino. Scientists had already confirmed indirectly that the particle exists, but "it was an experimental major success," says Gordon Kane, a physicist at the University of Michigan, Ann Arbor.

Neutrinos were discovered after scientists failed to balance their subatomic books. In the 1930s, Wolfgang Pauli proposed that a very lightweight, weakly interacting particle was carrying away the energy that was missing from radioactive decays. The existence of the neutrino was confirmed a few decades later. Physicists believe there are three types of neutrinos, each named for the fundamental particle it interacts with: The electron neutrino interacts with electrons, the muon neutrino with muons, and the tau neutrino with taus. (Some theories posit other varieties of neutrinos, such as the so-called "sterile" neutrinos, but nobody knows whether they exist.) When physicists have fired beams of electron neutrinos at a target, they produce electrons. Likewise, muon neutrinos shot at a target generate muons. But no one had observed this for tau neutrinos.

At the Direct Observation of the Nu Tau (DONUT) experiment based at the Fermi National Accelerator Laboratory near Chicago, scientists tried their hand with an 800–giga-electron-volt proton beam. When the beam smashed into a target, it created all manner of subatomic particles, including, presumably, tau neutrinos. The neutrinos then passed through meter-long steel targets. One out of every trillion tau neutrinos interacted with an iron nucleus and created a tau particle, which, in turn, left a telltale track on layers of emulsions that acted like photographic plates. The yield: four taus that the DONUT team is quite confident came from tau neutrinos.

"It was a hard experiment, an expensive experiment, and a somewhat unfashionable experiment," says Stanford University physicist Martin Perl. Physicists already knew that tau neutrinos existed, from missing-energy analysis of tau particles, so some scientists saw no need to perform it at all. Perl disagrees. "It was very, very important to find out," he says. "Not only does it confirm [the tau neutrino's] existence, it shows that it interacts in a more or less normal fashion." DONUT team member Regina Rameika agrees. "It's just a relief, really," she says. "It's kind of one of those things you had to do." **–CHARLES SEIFE**



Making tracks. About one tau neutrino in a trillion reacted with an iron nucleus, creating a tau particle that left its signature in emulsion plates.

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