

## Periodicals

tion for why people in different countries speak different languages, but these influences have been totally ruled out as a cause of certain psychopathologies, such as autism and schizophrenia. “Mothers don’t deserve some of the blame if their children have these disorders, as a nature-nurture compromise would imply,” Pinker notes. “They deserve none of it.”

It’s true that the expression of some genes is shaped by the environment, but that doesn’t mean, as some contend, that heredity is inconsequential. People taking this view often point to phenylketonuria (PKU), an inherited disease that causes mental retardation: Patients given a diet low in phenylalanine can avoid severe retardation. However, these advocates of the nurture perspective seldom note that “PKU children still have mean IQs in the 80s and 90s” and suffer other impairments, Pinker says. In fact, “genes specify what kinds of environmental manipulations have what kinds of effects and with what costs.”

Acknowledging and studying inborn proclivities can help us domesticate them. For

example, humans seem to have a natural sympathy for others, but it’s normally limited to their “own”: family, clan, or village. In the right environment, however, that sympathy can be expanded to “clans, tribes, races, or even species.” Understanding what those circumstances are can reveal “possible levers for humane social change.”

One of the most startling findings in behavioral genetics is the revelation through research on identical twins that family environment has “little or no effect” on individual intelligence and personality. Yet twins do nevertheless differ in important ways. So now researchers are asking new questions: What is the role of *peer* culture in the development of personality? What is the role of chance events? “These profound questions are not about nature versus nurture,” Pinker writes. “They are about nurture versus nurture: about what, precisely, are the nongenetic causes of personality and intelligence.” And they might never have been asked if researchers had thrown up their hands and ended the nature-nurture debate by agreeing to split the difference.

## To Be a Bee

“The *Edge* Annual Question—2005: What Do You Believe Is True Even Though You Cannot Prove It?” in *Edge* (Jan. 4, 2005), [www.edge.org](http://www.edge.org).

When it comes to many-legged critters, we humans are apt to squash first and ask existential questions later—if at all. But that’s a mistake, claims Alun Anderson, editor in chief of *New Scientist*, arguing that insects possess consciousness. That isn’t to say that the common cockroach is wondering how to make the next car payment or pondering the validity of string theory, but it is to say that it is capable of suffering and even dying simply from stress.

Anderson, a former biologist who conducted extensive studies of insects, proposes this theory in answer to a question the Edge Foundation put to 120 notables in the science world: “What do you believe is true even though you cannot prove it?”

In one experiment, Anderson examined how honeybees navigated his laboratory to

find hidden sugar. Bees learned the features in the room and showed confusion if objects were moved while they were absent. They were also easily distracted—by floral scents, sudden movements, and certain patterns, particularly flowerlike ones—except when gorging on sugar.

Anderson writes: “To make sense of this ever changing behavior, with its shifting focus of attention, I always found it simplest to figure out what was happening by imagining the sensory world of the bee, with its eye extraordinarily sensitive to flicker and colors we can’t see, as a ‘visual screen’ in the same way I can sit back and ‘see’ my own visual screen of everything happening around me, with sights and sounds coming in and out of prominence. The objects in the bee’s world have significances or ‘meaning’ quite differ-

ent from our own, which is why its attention is drawn to things we would barely perceive.

“That’s what I mean by consciousness—the feeling of ‘seeing’ the world and its associations. For the bee, it is the feeling of being a bee. I don’t mean that a bee is self-conscious or spends time thinking about itself. But of course the problem of why the bee has its own ‘feeling’ is the same incomprehensible

‘hard problem’ as why the activity of our nervous system gives rise to our own ‘feelings.’”

Many scientists remain skeptical that a bee with a brain of only a million neurons is much more than a simple collection of instinctive mechanisms. But 10 years spent studying the world from a bug’s-eye view convinced Anderson that “the world is full of many overlapping alien consciousnesses.”

## Who Owns Nature’s Secrets?

“Hyperownership in a Time of Biotechnological Promise: The International Conflict to Control the Building Blocks of Life” by Sabrina Safrin, in *The American Journal of International Law* (Oct. 2004), The American Society of International Law, 2223 Massachusetts Ave., N.W., Washington, D.C. 20008.

Can a company patent a fish gene? Not if it’s still in the fish. But if a biotech firm manages to extract and isolate a particular gene—say, the gene that enables a flounder to resist cold—many governments will now allow that company to patent its “invention.” What about as yet unimagined developments related to the original gene, or the extraction technique itself? International law has struggled to deal with such issues, but increasingly has moved toward a system that effectively blocks access to new genetic discoveries.

In the 1980s, according to Safrin, a professor at Rutgers University Law School, most biotech explorers operated largely without fetters. While that system encouraged scientific discoveries, it was, she acknowledges, “far from perfect,” and as companies started to realize—or at least predict—profits from their bio-prospecting, various restrictions began to emerge. The United States, the “world’s largest producer of bioengineered goods,” now “allows the patenting of genetic material to a greater degree than any other country.” In Safrin’s view, these patents have had a chilling ef-

fect, since the patents encumber any inventions relying on the protected material. The patents also alerted certain biotically rich nations, such as those with territory in the Amazon rain forest, that they were perched atop a potential bonanza. Under the developing doctrine of “sovereign enclosure” in



*In Colombia, the farmer owns the oxen, but the government owns their DNA.*

international law, some governments moved to lock up those raw genetic resources, adopting restrictions that require bio-prospectors to agree to share future profits, even before they know what kinds of discoveries they might make. One curious effect of this, says Safrin, is that “while a person in Colombia might own a plant or cow, the national government owns the genetic makeup of that plant or cow.”