honeybee colony, for example, where the queen cannot work and too many queens would reduce efficiency, workers "carefully select" the prospective royals (each likely to head her own colony) from the many wannabes and raise them in the "few special large cells in the brood comb."

But such benign preventive policing is not an option for a different species: stingless bees of the sort that rear their female larvae in sealed cells of the same size. To deal with the excess queens they produce, these bees resort to police brutality: Soon after the unfortunate creatures emerge from their cells in the brood comb, they're beheaded or torn apart.

Insect reformers, if such there be, have their work cut out for them.

Psychology Grows Up

"Psychology in Recovery" by Paul C. Vitz, in *First Things* (March 2005), Institute on Religion and Public Life, 156 Fifth Ave., Ste. 400, New York, N.Y. 10010.

When it was born in the 19th century, psychology had high hopes of donning a lab coat and growing up to be a science. That has happened to some of the discipline's offspring, but therapeutic psychology took another route—and had some wild times in its adolescence. Now, it too seems to be growing into a responsible adult.

Experimental psychology was one of the discipline's first offspring, and it now has children and grandchildren, according to Vitz, an emeritus professor of psychology at New York University. They are united by a focus on biology and brain function, and all are recognized as hard sciences. Physiological psychology is now known as neuroscience. Cognitive psychology (which deals with human memory, problem solving, learning, and the like) has begotten "such fields as cognitive neuroscience (focusing on brain activity) and cognitive science (focusing on artificial intelligence and robotics)."

Test-and-measurement psychology, a child of the early 20th century, has won recogni-

EXCERPT

Are We All Plagiarists Now?

The 1960s gave us, among other mind-altering ideas, a revolutionary new metaphor for our physical and chemical surroundings: the biosphere. But an even more momentous change is coming. Emerging technologies are causing a shift in our mental ecology, one that will turn our culture into the plagiosphere, a closing frontier of ideas.

The Apollo missions' photographs of Earth as a blue sphere helped win millions of people to the environmentalist view of the planet as a fragile and interdependent whole. The Russian geoscientist Vladimir Vernadsky had coined the word "biosphere" as early as 1926, and the Yale University biologist G. Evelyn Hutchinson had expanded on the theme of Earth as a system maintaining its own equilibrium. But as the German environmental scholar Wolfgang Sachs observed, our imaging systems also helped create a vision of the planet's surface as an object of rationalized control and management—a corporate and unromantic conclusion to humanity's voyages of discovery.

What NASA did to our conception of the planet, Web-based technologies are beginning to do to our understanding of our written thoughts. We look at our ideas with less wonder, and with a greater sense that others have already noted what we're seeing for the first time.

—Ed Tenner, science writer, in *Technology Review* (June 2005)

tion as a useful *social* science rather than a hard science, says Vitz. Researchers in this field develop tests to gauge intelligence, occupational aptitudes, mental pathologies, and other traits.

Therapeutic psychology, the branch that *is* psychology to most people, still has a modest base of scientific observation and experimental research, but it's no longer interested in being a science. The success of biologically based drug therapies in treating many psychological maladies is one reason. Modern therapeutic psychology uses "concepts and broad interpretive frameworks that are intrinsically nonscientific—and, indeed, philosophical in nature. The result is that psychology is becoming an applied philosophy of life," writes Vitz, a part of the humanities.

One sign of the field's new maturity is the emergence of "positive psychology." Traditional psychology focused on traumas and pathologies—and bred the victim mentality and flight from personal responsibility that now afflict American society. Positive psychology, built on the research of Martin Seligman of the University of Pennsylvania, seeks to balance the discipline's focus by looking at "traits that promote happiness and well-being, as well as character strengths such as optimism, kindness, resilience, persistence, and gratitude," according to Vitz. In making this shift, he writes, therapeutic psychology "has moved not only from science to philosophy, but also from the past and its effects to the future and our purposes, from mechanical determinism to teleology."

At the same time, therapeutic psychology has become far friendlier to religion than it was in its younger days. Indeed, "many clinical psychologists today are themselves religious." Ironically, that friendliness has something to do with the democratization of therapy, which has brought psychologists into greater contact with ordinary Americans.

Vitz sees the possibility of a new "transmodern" psychology that incorporates the wisdom of traditional religious and philosophical thinking in guiding people to better lives. It would be a "smaller and humbler" discipline, but far more useful to its public than the overeager adolescent ever was.

Genework

"The Unselfish Gene" by Johnjoe McFadden, in *The Guardian* (May 6, 2005), 119 Farringdon Rd., London EC1R 3ER, England.

For decades, scientists have been in hot pursuit of the genes for this and that—for heart disease, autism, schizophrenia, homosexuality, criminality, even genius. For the most part, they've come away empty-handed. As a result, many are turning to "an entirely new way of doing biology: systems biology," says McFadden, a professor of molecular genetics at the University of Surrey, England.

Scientists studying the cell's metabolic pathways picked up some early clues that something was amiss in their search for isolated genes. The metabolic pathways are like a network of roads that transport food to enzymes, which assemble the useful molecules into more cells. Biotechnologists seeking to engineer the cells to produce certain types of new cells found their efforts hindered by genes that appeared to be controlling the whole network's operation. Striking back, the scientists engineered the genes to prevent them from taking control. But it didn't matter: The metabolic pathways swiftly went back to business as usual.

Geneticists were also frustrated and puzzled by the many genes that had no apparent function at all. Take the "prion gene," which mad cow disease turns into a pathogenic brain-destroying protein. What does this gene normally do? "The standard way to investigate what a gene does is to inactivate it and see what happens," McFadden writes. Yet when geneticists did that to the prion gene in mice, *nothing* happened: The mutant mice were perfectly normal. But a functionless gene isn't really a "gene" at all, as the entity is conventionally understood, for it is invisible to natural selection.

Instead of having a single major function, McFadden writes, most genes "probably play a