

neurons, or nerve cells, in the brain. The secrets of the brain lie in "the variable ways in which neurons form networks," writes Levine, a mathematician at the University of Texas, Arlington.

How are neurons organized? The latest theory to emerge, says Levine, is called "neural Darwinism." One of its leading advocates, Gerald M. Edelman, of Rockefeller University, sees a two-stage process. In the embryo, each brain develops its own distinct neural networks, guided by chemical agents called cell adhesion molecules (CAMs). Just as CAMs create thousands of feathers in chickens, making no two feathers identical, so they create a multitude of subtly different neural networks in the brain.

The second stage occurs after birth, when the strengths of the synapses (between the neurons) are modified by sights, sounds, and other outside stimuli.

Ultimately, the workings of the brain are

determined by "competition" among different neural networks to interpret external stimuli. The "winners" suppress the "losers." The "winners" are generally those that receive the most stimulation during early development. Thus, cats that are raised in a laboratory painted with horizontal stripes, and are then suddenly placed in a room painted only with vertical stripes, tend to bump into the walls. The neural pathways responsible for horizontal perception override those that govern vertical perception.

How, then, does one explain Einstein's genius? Presumably, he owed it both to his unique endowment of neural networks *and* to their early stimulation.

What is most important about neural Darwinism, Levine notes, is that it says "that the ways in which human beings perceive, learn, and remember are not fixed—not genetically determined or otherwise preordained."

RESOURCES & ENVIRONMENT

Greenhouse Effect?

"About That Drought . . ." by Richard R. Heim, Jr., in *Weatherwise* (Oct. 1988), Heldref Publications, 4000 Albemarle St. N.W., Washington, D.C. 20016.

As Americans sweltered through the summer of 1988, many climatologists warned that planet Earth could be experiencing the onset of the "greenhouse effect," caused by the buildup of man-made carbon dioxide in the atmosphere. [See *WQ*, "Climate," Winter 1988.]

Maybe not, says Heim, a meteorologist at the U.S. National Climatic Data Center. During the past two decades, he notes, the United States has endured five of the warmest years since recordkeeping began in 1895. But it has also experienced seven of the 20 coldest years. The link between last summer's heat wave and the greenhouse effect, Heim believes, remains ambiguous at best.

Likewise, the destructive drought of 1988 "was not as bad as the droughts of

the 1930s and 1950s—and probably other[s] that occurred before weather records were kept." In 1934, drought afflicted 61 percent of the country, from western New York state to the Pacific coast. On April 14, 1935, several people suffocated in a dust storm that struck Stratford, Texas. During 1953–54, drought covered 51 percent of the country. Last year's drought affected 45 percent; the year brought the *driest* growing season on record in only 12 percent of the nation's area.

Since the 1950s, Heim reports, despite scattered dry years, the nation actually has been experiencing a wet spell. Eight of the 20 wettest years on record have occurred during the 1970s and '80s. Last year, unnoticed by the news media, the desert Southwest was being "drenched by the wettest

weather in decades."

Viewed in historical perspective, Heim concludes, the hot, dry weather of 1988

was "simply the latest in a long series of similar fluctuations that characterize the climatic history of our country."

Reforming EPA

"Are Today's Institutional Tools Up to the Task?" by Michael Gruber, in *EPA Journal* (Nov./Dec. 1988), Superintendent of Documents, GPO, Washington, D.C. 20402.

On April 22, 1970, millions of Americans celebrated the nation's first Earth Day—and within three years Congress had created the U.S. Environmental Protection Agency (EPA) and passed sweeping new anti-pollution laws.

Today, writes Gruber, an EPA staffer, there is not only public disappointment with the results but a "widening gap" between what Americans expect and what "EPA can deliver." The federal agency (budget: \$1 billion) has been told by Congress to eliminate water pollution, eliminate *all* risk from air pollution, prevent hazardous waste from reaching the ground water, and register, and "re-register," all pesticides.

"None of these things," Gruber notes, "has been accomplished," nor could they be. To blame, he says, are the sheer uncertainty of scientific knowledge (notably about various pollutants' true effects on health), a patchwork of environmental laws, Congress's multiple mandates, and Americans' two-faced attitudes towards the environment. Opinion polls show

strong support for environmental clean-ups. Yet, Americans dislike government interference, prize their automobiles, enjoy cheap foodstuffs and plastics, resent land use controls, and like to throw things away.

Congress, says Gruber, must allow the EPA to concentrate on major hazards, to focus realistically on "reduction of risk" to public health and the environment rather than, as at present, on ineffective, generalized "pollution control." Instead of requiring the use of certain types of technology, the EPA should adopt marketplace incentives and penalties to curb pollution.

Of late, Gruber adds, the EPA has frittered away its efforts in response to public outcries over much-publicized but relatively minor threats, notably those involving pollutants which may expose the public to some risk of cancer. "This is a long way," he contends, "from the original ideal of the environmental movement, which was nothing less than to bring technological society into harmony with the natural world."

ARTS & LETTERS

The Peales

"Philadelphia Story" by Phoebe Lloyd, in *Art in America* (Nov. 1988), 542 Pacific Ave., Marion, Ohio 43306.

Charles Willson Peale (1741–1827) is remembered as a Philadelphia impresario and portrait artist who painted Washington, Franklin, and other heroes of the Revolution. His eldest son, Raphaelle (1774–1825), a well-regarded still-life painter in his day, is now remembered, if at all, as a drunk and wastrel. For that, and

for his premature death, says biographer Lloyd, one can blame the twisted envy of Raphaelle's noted father.

Of the younger Peale's talent there can be no doubt, writes Lloyd. His pictures hung in Philadelphia's prestigious Pennsylvania Academy. But father and son clashed early and often. At 23, Raphaelle married