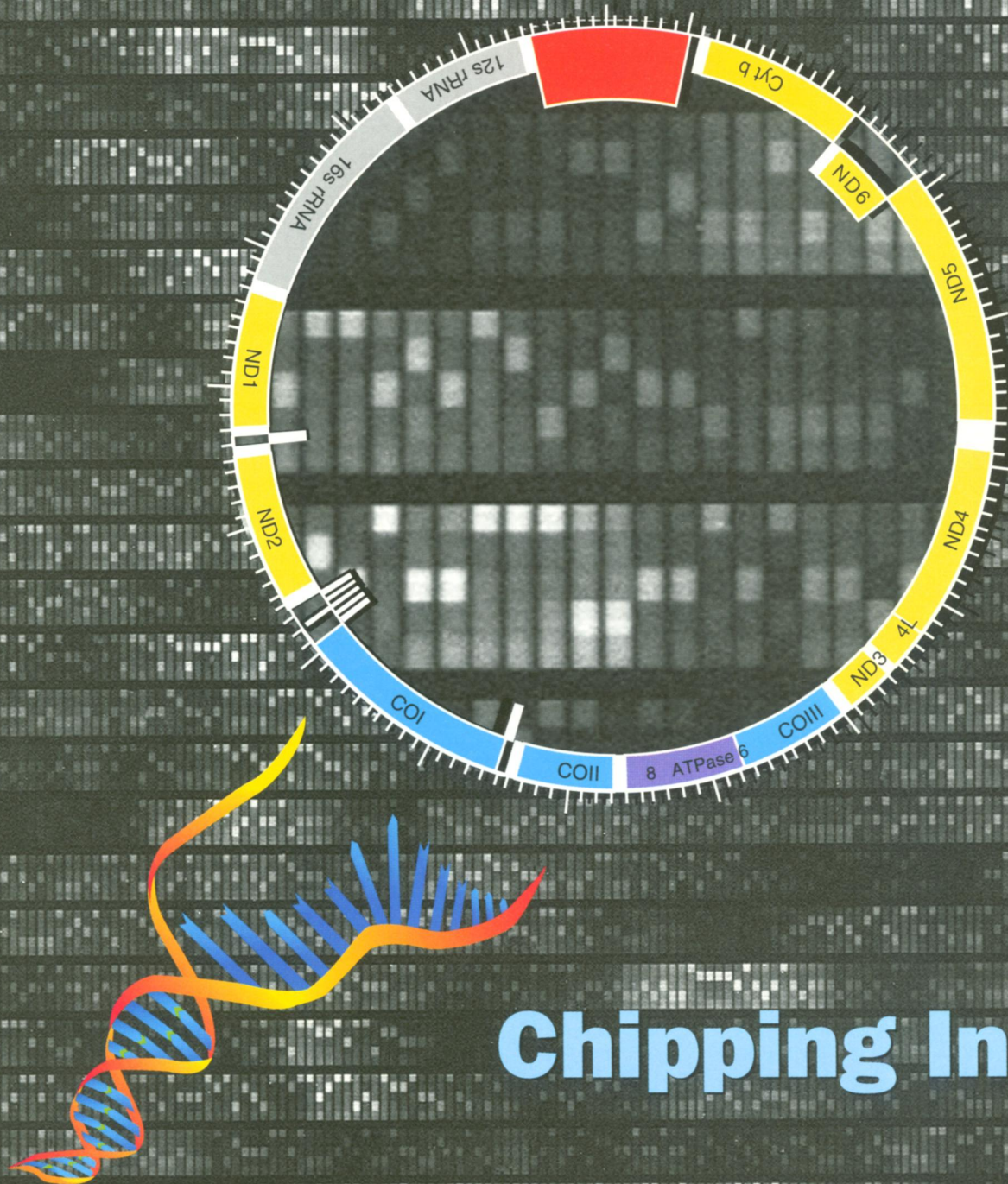


The Weekly Newsmagazine of Science

# SCIENCE NEWS

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Evolving something new "on the fly" involves a great deal of creative trial and error inside the brain, mostly in the last second before speaking aloud. Starting from themes as disjointed and unrealistic as those of a dream, you make something of quality out of the subconscious morass. How?

This book tries to fathom how our inner life evolves from one second to the next, as we steer ourselves from one topic to another, as we create and reject alternatives. It's not just a little person inside the head doing all this, though it's natural to assume that anything fancy requires an even fancier designer. Ever since Darwin, however, we've known that elegant things can emerge (indeed, self-organize) from "simpler" beginnings.

Theoretical neurophysiologist William H. Calvin says the bootstrapping of new ideas works much like the immune response or the evolution of a new animal species—except that the brain can turn the Darwinian crank a lot faster, on the time scale of thought and action. Few proposals achieve a perfect 10 when judged against our memories, but we can subconsciously try out variations, using many brain regions. Eventually, as quality improves, we become conscious of our new invention.

Drawing on anthropology, evolutionary biology, linguistics, and the neurosciences, Calvin also considers how a more intelligent brain developed via slow biological improvements over the last few million years. Long ago, evolving jack-of-all-trades versatility was encouraged by abrupt climate changes. Now, evolving intelligence uses a nonbiological track: augmenting human intelligence and building intelligent machines.

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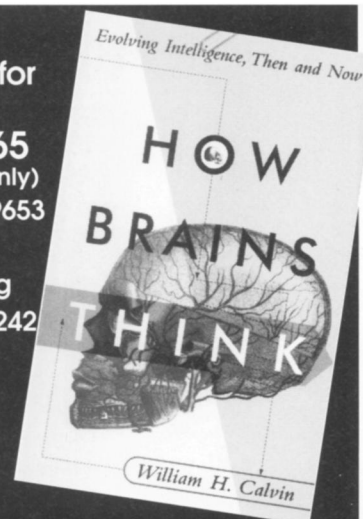
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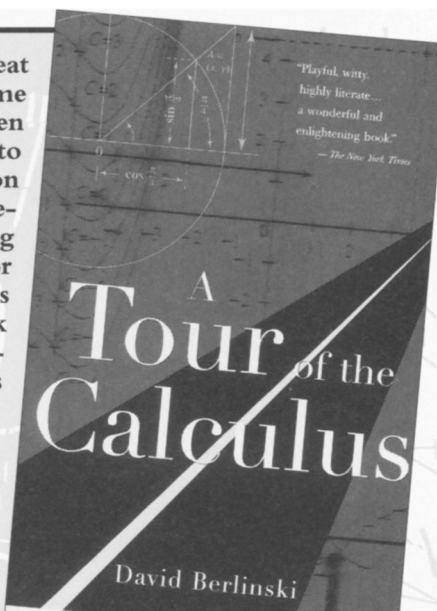
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**T**he calculus represents humanity's great and profound meditation on the theme of continuity. Time and space are given voice, and speed and area are subordinated to the harsh concept of a limit. The introduction of real numbers allows the landscape of mathematical analysis to be suffused with thrilling light. In that lit-up landscape, the infinite is for the first time charmed into compliance as men and women gain the eerie power to ask of certain processes, Suppose it goes on forever, what then? and finding within the calculus a comprehensive answer.

In clear and instructive language, David Berlinski explains the concept of limits, how a function describes a relationship between numbers, and the meaning of real numbers and their role in the re-creation of the world. Hidden for centuries from human insight, an array of mathematical operations and processes becomes visible.

Berlinski's great achievement is that he not only breathes life into the principles of the calculus but he also reveals processes that occur in the real world. Moving beyond the basics, Berlinski shows us in dramatic and original ways that the calculus is more than a system of mathematics. It is also an instrument commensurate at last with humanity's limitless capacity to regard the universe with wonder.

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